- الإنسان الناجح هو الذى يُغلق فمه قبل أن يُغلق الناس آذانهم، ويفتح أذنيه قبل أن يفتح الناس أفواههم.
- استمع كثيراً، تكلم قليلاً، و لا تكن سريع الغضب.
- جميل جدًا أن تجعل من عدوك صديقاً، و الأجمل ألا يتسع قلبك للعداوة.
- قُل ما تعتقده، و لكن لا تقله إلا بعد أن تفكر فيه.
- قم للمُعلم وفه التبجيلا كاد المعلم أن يكون رسُولا.

الشروق
الحديثة للطباعة والتغليف

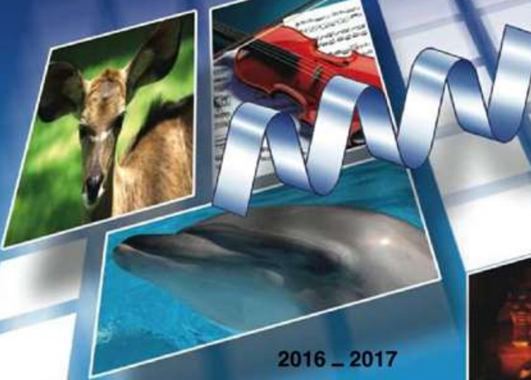
First Term

Think and Learn

Arab Republic of Egypt
Ministry of Education
Book Sector

Science

Think and Learn



2016 _ 2017

First Term

Preparatory two

غير مصرح بتداول هذا الكتاب خارج وزارة التربية والتعليم

Arab Republic of Egypt
Ministry of Education
Book Sector

Science

think and learn

2nd prep.

first term

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2016 – 2017

غير مصرح بتداول هذا الكتاب خارج وزارة التربية والتعليم

المقـــدمـــة

عزيزى التلميذ / التلميذة : ....

يسعدنـا أن نقـدم هـذا الكتاب لأبنائنـا تلاميذ الصـف الثانى الإعـدادى، ونؤكد على أن تعلـم العلوم عملية نشطـة وممتعة ومثيرة للتفكير فى تنفيذ الأنشطة العملية، وتصميم النماذج والأشكال والجداول، وكتابة التقارير والبحـوث البسيطة، والتقصى والتحقق من البيانات والمعلومات، وطـرح الأسئلة والتأمل والتواصل، والقيام ببناء التفسـيرات عـن المفاهيم والظواهـر الطبيعية، وتطبيق المعرفة فـى المواقف الحياتية، وحـل المشكلات من خلال التخطيـط والتجريـب والتعلم التعاونـى، وهذه الإجـراءات والمهارات هى التـى يتناولها تعلم العلـوم القائم على الاستقصاء والتعلم النشط، واستخدام مهارة التفكير العلمى والابتكارى أو الإبداعى والنقد والتأمل.

وقـد تم اختيـار عنوان لهذا الكتاب يعكس فلسفته، وهو فكِّر وتعلَّـم، وقد تم الاسترشاد فى إعداده بآراء بعض المتخصصـين فى المناهج وطرق تدريس العلوم والموجهين والمعلمين والتلاميذ، تأكيدًا لفلسفة الكتاب وأسس بنائه وتطويره، وتم تحديد فلسفة الكتاب فى ضوء المعايير القومية للتعليم وللتربية العلمية.

ويهـدف هذا الكتاب إلى مساعـدة التلاميذ على إدراك العلاقة بين العلـم والتكنولوجيا، وفهم تاريخ وطبيعة العلم، وتنمية مهـارات التفكير والمهارات الحياتية، والفهم العلمى السليم للمفاهيم الأساسية، وتنمية الاتجاهات العلميـة والقيـم الاجتماعية لتحقيـق التربية العلمية للمواطنـة وللحياة وللعمل، من خلال إثـارة تفكير التلاميذ، والاستفـادة مـن مراكز ومصادر التعلـم داخل المدرسـة وخارجها، بالإضافـة إلى توظيـف استراتيجيات التعلم النشط والتعلم البنائى ولتحقيق هذه الأهداف تم استخدام مداخل متنوعة فى شكل وحدات وموضوعات دراسية مترابطة ومتكاملة مع بعضها ومع المواد الدراسية الأخرى.

ويتناول كتاب الفصل الدراسى الأول ثلاث وحدات، هى :

- دورية العناصر وخواصها
- الغلاف الجوى وحماية كوكب الأرض
- الحفريات وحماية الأنواع من الانقراض

ونحن إذ نقدم هذا الكتاب نرجو الله أن يحقق الفائدة منه.

والله ولى التوفيق،،،

المؤلفـــان

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Unit 1

Periodicity of Elements and their Properties

Lessons of the unit

Lesson 1 : Attempts of elements classification.

Lesson 2 : Graduation of elements properties in the modern periodic table.

Lesson 3 : Main groups in the modern periodic table.

Lesson 4 : Water.

Sources of knowledge and learning

- Books and scientific encyclopedia

1 Greal Law in Chemistry	Mare House
2 Easy Chemistry Dorothy Paul	Lebanon Bookshop
3 Water	Family Bookshop
4 Water Steve Parker	El Farouk House

Learning objectives of the unit

At the end of this unit , the student should be able to :

1. Follow the efforts and attempts of some scientists to classify elements (Mendleev - Moseley - Modern Periodic Table)
2. Recognize the principles of elements classification in the modern periodic table.
3. Estimate scientists efforts in discovering , classifying and investing elements.
4. Determine the location and properties of some elements in the modern periodic table by recognizing their atomic numbers.
5. Compare the properties of groups and periods in the modern periodic table.
6. Compare between metals, nonmetals , semimetals and inert gases in their electronic configuration and chemical activity.
7. Describe main groups in the modern periodic table.
8. Describe elements properties and their uses.
9. Use tools, materials and instruments in studying elements properties.
10. Recognize the importance of water and its sources.
11. Determine the chemical and natural properties of water.
12. Explain the irregularity of the natural properties of water.
13. Describe the chemical bonds among the atoms and molecules of water (covalent and hydrogen)
14. Recognize the polarization of some chemical compounds (Water-Ammonia)
15. Recognize the electrolysis of water.
16. Explain the equivalence of water.
17. Describe how water reacts with some of the elements of chemical activity series.
18. Determine water pollutants and their bad effects.
19. Determine the methods and measures for protecting water from pollution.
20. Estimate the importance of water locally and internationally.
21. Determine his/her personal responsibilities to protect water from pollution.
22. Make needed decisions to protect water from pollution.

Lesson 1

Attempts of Elements Classification

Lesson objectives

At the end of this lesson, the student should be able to :

1. Recognize the efforts of some scientists to classify elements.
2. Recognize the principles of elements classification in the modern periodic table.
3. Determine the location of some elements in the modern periodic table by recognizing their atomic numbers.
4. Deduce the atomic numbers of some elements by recognizing their locations in the modern periodic table.
5. Estimate the importance of discipline and organisation in our life.
6. Estimate scientists efforts in discovering, classifying and investing elements.

Points of the lesson

1. Mendleev's periodic table.
2. Moseley's periodic table.
3. Modern periodic table.

Included cases

1. Investment of environmental elements and raw materials.
2. Discipline and organisation.
3. Scientific research and its importance in discovering elements.

Many attempts are made by scientists for classification of elements to be easily studied, and find the relation between elements and their physical and chemical properties.

Mendeleev's periodic table is considered as the first real periodic table for classification of the elements.

Activity (1) Discovering the periodicity of the properties of elements.

Share with your classmates in co-operating groups and arrange the circles in front of you according to their colours and the graduation of their numbers in the four vertical columns in the table.

Table (1)

	Column 1	Column 2	Column 3	Column 4
Row 1				
Row 2				
Row 3				

5	10	26	22
7	15	20	30
8	16	14	12

Observations :

1. What do you observe about the graduation of numbers in the circles in each horizontal row ?

....

2. What do you observe about the repetition of colours of circles in the horizontal rows ?

....

The activity you did, doesn't differ from what the Russian Scientist Mendeleev did. In 1871. Fig. (1), he recorded on single cards: the names of the elements, their atomic weights and their important properties. He arranged the similar elements in vertical columns called "groups" later. He discovered that the elements were arranged in an ascending order according to their atomic weights from left to right in the horizontal rows, which were later called "periods" and their properties are periodically repeated at the beginning of each new period. Mendeleev explained his periodic table in his book "Principles of Chemistry" In 1871, and classified the known elements until this time to be (67) elements, and he also classified each main group into two subgroups (A, B) where he found differences between their properties.

Mendeleev
Fig. (1)

Enrichment information (1)

* Some elements have many forms having the same atomic numbers but differ in atomic weights which known as "Isotopes".
* Read and collect information about Scientist Mendeleev. (Use magazines , encyclopedias and the internet).

Advantages and disadvantages of Mendeleev's table.

Mendeleev predicted the ability of discovering new elements. So he left spaces (empty cells) in his table, and he corrected the wrong estimated atomic weights of some elements. He had to make a disturbance in the ascending order of atomic weights for some elements, due to putting them in groups which suit their properties, and he also would have to deal with the isotopes of one element as different elements because they are different in their atomic weights.

Enrichment information (2)

In 1871, Mendeleev predicted the properties of an unknown element and named it ICA silicon that was named germanium (Ge) and its properties was the same as Mendeleev had predicted.

Self inquiry

Did you ask yourself: Why did he put more than an element in one place?

Communication

Discuss with your classmates under the supervision of your teacher about advantages and disadvantages of Mendeleev's periodic table.

Moseley's periodic table

In 1913, the Newzealand Scientist Rutherford discovered that the nucleus of atom contains positively charged protons, the British Scientist Moseley discovered in the same year after studying the properties of x rays that the periodicity of elements properties is related to their atomic number not their atomic weights as Mendeleev believed.

So Moseley rearranged the elements in an ascending order according to their atomic number such that the atomic number of an element increases by one than the element

Enrichment information (3)

* From the discoveries which have helped Moseley to put his periodic table are :
  1. Radiation activity phenomena.
  2. Getting of x-rays.
  3. The more knowledge about the arrangement of electrons in atoms.

before it in the same period, and he added the inert gases in the (0) zero group, and he lecated a place below his periodic table for the two groups lanthanides and actinides.

Exercise (1)

What is the scientific principle on which the classification of the elements based on ?

- Mendeleev's periodic table: ....
- Moseley's periodic table ....

The modern periodic table

After the Danish Scientist Bohr discovered the main energy levels fig. (2). They are 7 in the known heaviest atom so far. It was discovered also that each main energy level consists of a number of energy levels known as the energy sublevels.

* Elements are classified in the modern periodic table according to:

* Their atomic numbers and the way of filling the energy sublevels with electrons.

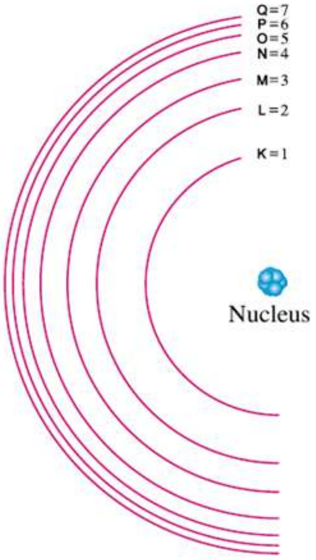
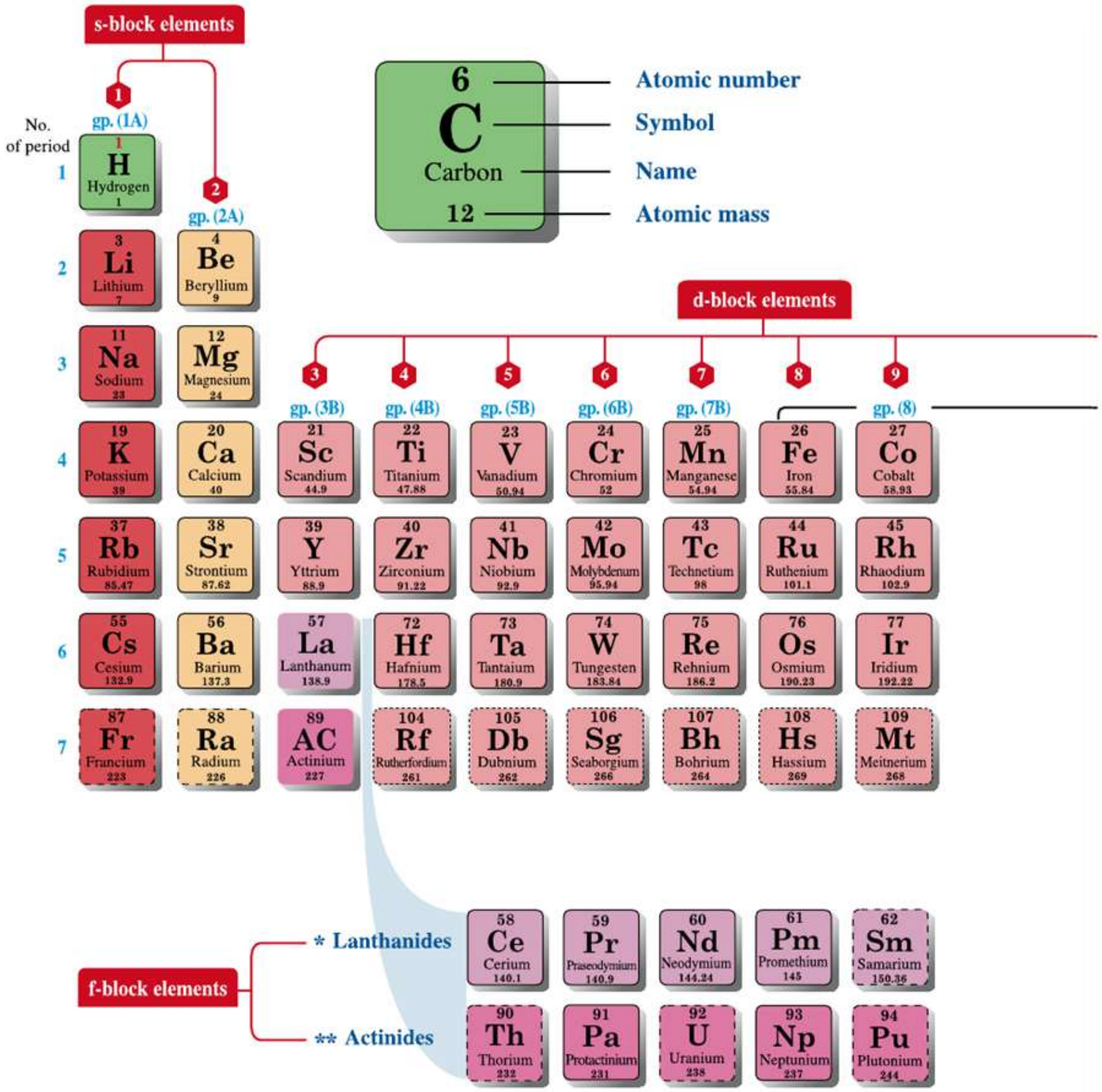


Fig. (2)

Enrichment Information (4)

Each main energy level contains a number of energy sub-levels equal to its number.

For example the main fourth energy level N consists of four energy sub-levels which are s,p,d and f.



The periodic table

Fig. (3)

P-block elements

10	11 gp. (1B)	12 gp. (2B)	13 gp. (3A)	14 gp. (4A)	15 gp. (5A)	16 gp. (6A)	17 gp. (7A)	18 gp. (0)
								2 **He** Helium 4
			5 **B** Boron 10.81	6 **C** Carbon 12	7 **N** Nitrogen 14	8 **O** Oxygen 16	9 **F** Fluorine 19	10 **Ne** Neon 20
			13 **Al** Aluminum 27	14 **Si** Silicon 28	15 **P** Phosphorus 31	16 **S** Sulphur 32	17 **Cl** Chlorine 35.5	18 **Ar** Argon 40
28 **Ni** Nickel 58.69	29 **Cu** Copper 63.55	30 **Zn** Zinc 65.39	31 **Ga** Gallium 69.72	32 **Ge** Germanium 72.64	33 **As** Arsenic 74.92	34 **Se** Selenium 78.96	35 **Br** Bromine 80	36 **Kr** Krypton 83.8
46 **Pd** Palladium 106.42	47 **Ag** Silver 107.9	48 **Cd** Cadmium 112.4	49 **In** Indium 114.8	50 **Sn** Tin 118.7	51 **Sb** Antimony 121.75	52 **Te** Tellurium 127.6	53 **I** Iodine 127	54 **Xe** Xenon 131.3
78 **Pt** Platinum 195.1	79 **Au** Gold 197	80 **Hg** Mercury 200.6	81 **Tl** Thallium 204.4	82 **Pb** Lead 207.2	83 **Bi** Bismuth 209	84 **Po** Polonium 209	85 **At** Astatine 210	86 **Rn** Radon 222
110 **Ds** Darmstadtium 281	111 **Rg** Roentgenium 272	112 **Cn**	113 **Uut** Ununtrium 284	114 **FI**	115 **Uup** Ununpentium 288	116 **Lv**	117 **Uus**	118 **Uuo**

63 **Eu** Europium 152	64 **Gd** Gadolinium 157.25	65 **Tb** Terbium 158.9	66 **Dy** Dysprosium 162.5	67 **Ho** Holmium 164.9	68 **Er** Erbium 167.3	69 **Tm** Thulium 168.9	70 **Yb** Ytterbium 173	71 **Lu** Lutetium 175
95 **Am** Americium 243	96 **Cm** Curium 247	97 **Bk** Berkelium 247	98 **Cf** Californium 251	99 **Es** Einsteinium 252	100 **Fm** Fermium 257	101 **Md** Mendelevium 258	102 **No** Nobelium 259	103 **Lr** Lawrensium 262

Alkali metals	Alkaline earth metals	Lanthanides	Actinides	Transition metals
Poor metals	Metalloids	Nonmetals	Halogens	Noble gases

State at standard tempurature and pressure

- Atomic number in red: gas
- Atomic number in blue: liquid
- Atomic number in black: solid

- solid border: at least one isotope is older than the Earth (Primordial elements)
- dashed border: at least one isotope naturally arise from decay of other chemical elements and no isotopes are older than the earth
- dotted border: only artificially made isotopes (synthetic elements)
- no border: undiscovered

Description of the modern periodic table

Activity (2) Description of the modern periodic table

Participate with your classmates in forming co-operating groups for studying the modern periodic table and record observations for the following questions:

1. Determine the location of s, p, d and f blocks in the periodic table.
   ....
2. What are the groups of s block ? ....
3. What are the groups of p block ? ....
4. What is the characterized letter for transition elements in (d) block ? ....
   And what is the group number which is not characterized by this letter ? ....
   And what is number of vertical columns in it ? ....
5. What is the period in which the appearance of the transition elements begins ? ....
6. What are the numbers of periods and groups of the modern periodic table ? ....
7. What is the new number for 0 group (inert gases) and 5A group?

From studying the modern periodic table:

- The number of known elements until now are 118 elements, 92 elements are abundant in the earth's crust, the rest of the elements are prepared artificially.
- Elements of (A) groups lie on the left and right of the table, you can locate their position in the modern periodic table by knowing their atomic numbers and vice versa.
- The elements of (B) groups lie in the middle of the table.

Enrichment Information (5)

(1) Recently discovered elements are not found in nature but they are prepared artificially.

(2) These elements are radioactive elements, their nuclei are decayed in less than a second.

(3) Use Excel Program in drawing a table that explains periods and groups of periodic table.

Exercise (2)

Mention the kind and the block of the element, which is located in group 3B and fourth period.

Life application **House library**

- Form a bookstore at your home (Use Family Library - school library). Apply what you have studied about the elements classification in arranging them in horizontal rows and vertical columns. including the subject of the book (scientific, historical, religious, ...) and making an index for the books to facilitate the search process.

House library figure (4)

Activity (3) Determination of the position of the element in the periodic table by knowing its atomic number

Participate with your classmates in the co-operating group to do the following activity.

Steps :

1. Write the electronic configuration for elements explained in the table (2).
2. Determine the number of energy levels, the number of electrons in the outermost energy level for each element.
3. Determine the number of period and group for each element (Use the modern periodic table).

Table (2)

Element	$_{20}Ca$	$_{15}P$	$_{10}Ne$	$_{1}H$
* Electronic configuration	+20	+15	+10	+1
* Energy levels	....	....	....	....
* Number of period	....	....	....	....
* Number of electrons in outermost energy level	....	....	....	....
* Number of group	....	....	....	....

UNIT ONE

Observation :

1. What is the relationship between the number of energy levels occupied by electrons in the atom of the element and its period number ?

....

2. What is the relationship between the number of electrons in the outermost energy level of the atom of the element and its group number ?

....

Conclusion :

1. Number of period of the element = Number of energy levels occupied by electrons in its atom.
2. Number of the group of the element = Number of electrons in the outermost energy level in its atom.

Exercise (3)

Classify the elements into two groups :

$_{2}He$ – $_{3}Li$ – $_{19}K$ – $_{10}Ne$ – $_{11}Na$

....

....

Activity (4) Determination of the atomic number of the element by knowing its location in the periodic table.

Participate with your classmates in the co-operating groups to do the following activity.

Steps :

1. In the table (3) determine the number of energy levels occupied by electrons for each element by knowing its period number.
2. Write below the outermost energy level of each element, the number of electrons in it by knowing the number of its group.
3. Complete the number of electrons in the inner energy levels filled with electrons for each element by knowing the number of its group.
4. Write the number of positive protons inside the nucleus for each element by knowing the number of electrons.

Observations :

Table (3)

Period \ Group	5A	6A	7A	0
Second period	N +7	O	F	Ne
Third period	P	S	Cl	Ar

1. What is the atomic number of F and Ar ?

....
....
....

2. What is the expected atomic number for S and Cl ?

....
....
....

3. Can scientists discover a new element between S and Cl ?

....

Conclusion :

1. The atomic number of an element = Sum of the number of electrons which rotate around the nucleus of its atom and also = The number of protons in the nucleus.
2. The atomic number of an element is a whole number increasing through periods from one element to the following element by (1).

A case for discussion — **Development of scientific and life concepts**

1. The classification of elements passed several stages, each of them tried to avoid the mistakes of its predecessors and benefitted from the newly established theories, experiences and scientific results.

   * Discuss this issue with your classmates under the supervision of your teacher issuse and these questions should be a part of the subject of discussion.

2. Is what you believe in today will remain for ever in your mind ?

   * Which do you prefer to complete your tasks and scientific researches, individual work or group work ? Why ?
   * From where do you gain your experience, your personal experiences or the experiences of others ?
   * Is there a relationship between the development of scientific concepts and societal changes ?

Lesson summary

Classification of elements

- Modern periodic table
  - Elements are arranged ascendingly according to their atomic numbers and the way of filling the energy sublevels with electrons.
    - Blocks of elements.
      - s block – p block – d block – f block
    - 7 horizontal periods and 18 vertical groups.
- Moseley's periodic table
  - Elements are arranged ascendingly according to their atomic numbers.
- Mendeleev's periodic table
  - Elements are arranged ascendingly according to their atomic weights.

- Each main energy level contains a number of energy sublevels.
- Transition elements start to appear in the fourth period.
- Number of period of the element = Number of energy levels occupied by electrons.
- Number of group of the element = Number of electrons in the outermost energy level in its atom.

Evaluation on lesson 1

1 Complete:

(1) Mendeleev arranged the elements ascendingly according to ....
while Moseley arranged them ascendingly according to ....

(2) The modern periodic table consists of .... horizontal periods , ... vertical groups.

2 What is the scientific base on which the modern periodic table classified ?

3 Locate the position of the following elements in the modern periodic table :

(1) $_{1}H$ ....

(2) $_{10}Ne$ ....

(3) $_{20}Ca$ ....

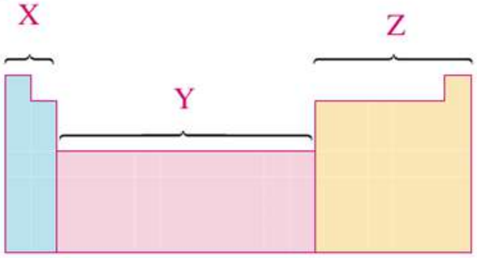
4 Find the atomic number for the following elements.

(1) Element X lies in the first period and zero group ....

(2) Element Y lies in the second period and 3A group ....

(3) Element Z lies in the third period and 7A group ....

5 Notice the following figure which represents a part of the modern periodic table, then answer the following :



(1) What are the names of blocks which are characterized by the letters X , Y , and Z ?

....

(2) What is the number of groups in each block ?

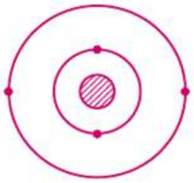
....

(3) What is the new number of 7A group and zero group ?

....

❻ Study the opposite figure which

explains the electronic configuration for an element in the modern periodic table and conclude the atomic number of the element which follows this element in :



(1) The same period..

(2) The same group...

❼ Creative Thinking :

Imagine a new form of classification of elements which their atomic numbers range between 1 - 20 such that each group contains similar elements.

....

....

Activity

Search in your school library or internet for the attempts which precedes Mendeleev's attempt for classification of elements.

Lesson 2

Graduation of Elements in the Modern Periodic Table

lesson objectives :

At the end of the this lesson, the student should be able to:

1. Determine the properties of some elements by knowing their atomic numbers.
2. Compare between some elements according to the electronic configuration and the chemical activity.
3. Identify metals, nonmetals and metalloids.
4. Compare between the properties of the groups and the periods of the periodic table.
5. Identify the polarity of some chemical compounds.
6. Identify the behaviour of some metals of the chemical activity series with water.
7. Use tools and substances discovering the chemical properties of metals and nonmetals.

Points of the lesson :

1. Atomic size property.
2. Electronegativity property.
3. Metallic and nonmetallic property.
4. Chemical activity series.
5. Chemical properties of metals.
6. Chemical properties of nonmetals.

Included cases :

1. Using of the elements and environmental resources.
2. Graduation of responsibilities of both personal and social decisions.
3. Integration of responsibilities and roles.

This lesson discusses the graduation of some elements properties in the periods and the groups (A) in the periodic table and the relation between these properties and the electronic configuration of elements.

1 Atomic size property :

Activity (1) Discovering of the graduation of atomic size in the periodic table.

Think carefully with your colleagues in the co-operating group (figure 1) and record your observations on the following questions :

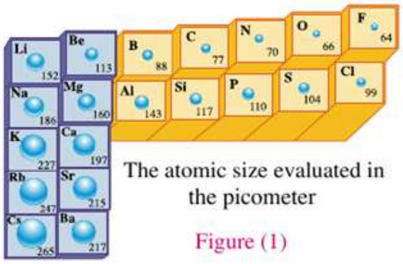
What do you observe for the graduation of the values of the atomic size of elements in relation to the increasing of the atomic number ?

- In periods

....

- In groups

....



The atomic size evaluated in the picometer

Figure (1)

«Picometer = part of a million of a million of metre»

From the previous, we conclude that:

1. The atomic size of the same period decreases by the increase of their atomic numbers. Due to the increase of the attraction force between positive nucleus and the electrons in the outermost energy level.
2. The atomic size of the same group increases by the increase of their atomic numbers due to the increase of the number of the energy levels in the atoms.

2 The electronegativity property:

It is defined as the ability of the atom in the covalent molecule to attract the electrons of the chemical bond towards itself.

Activity (2) Discovering the graduation of electronegativity in the periodic table.

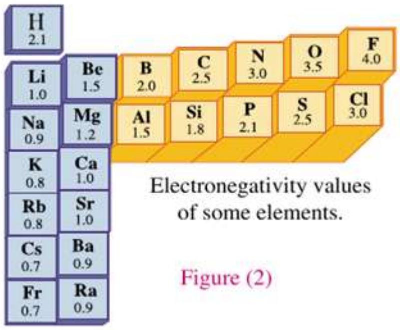
Observe and think carefully with your classmates (Fig. 2) and record your observations on the following questions :

1. What do you observe for the graduation of values of the electronegativity of elements by increasing the atomic number ?
   - In periods

   ....

   - In groups

   ....



Electronegativity values of some elements.

Figure (2)

2. Which element has the highest electronegativity ?

....

From the previous, we can conclude that :

1. By increasing the atomic number, the electronegativity of elements of the same period increases, but it decreases in the same group.
2. The electronegativity of flourine element is the highest value and equals 4

Exercise (1)

What is the electronegativity difference between the two elements of the ionic sodium chloride compound ?

....

The polar compounds

To understand the concept of the polarity of some chemical compounds, you can do the following activity.

Activity (3) Determination of the properties of the polar compounds.

1. Record in table (1) the values of electronegativity. For the illustrated elements in it (Use figure 2)
2. What is the electronegativity difference between :
   - Oxygen and hydrogen in H_2O molecule.

   ....
   - Nitrogen and hydrogen in NH_3 molecule.

   ....

Table (1)

....	Oxygen
....	Nitrogen

3. Which of the two elements has high ability to attract the electrons of the bond towards itself in :

(A) Molecule of water H_2O

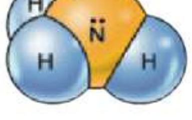
....

(B) Molecule of ammonia NH_3

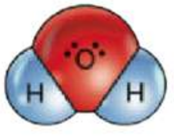
....

From the previous we can consider that :

1. The polar compound is a covalent compound, the electronegativity difference between its elements is relatively high.
2. Water molecule and ammonia molecule are from examples of polar compounds (Fig. 3).



Polar ammonia molecule



Polar water molecule

(Fig. 3)

Enrichment information (1)

the covalent bond is described as pure when the electronegativity difference between the two joined atoms equal zero.
What is the kind of covalent bond in oxygen molecule ?

Self inquiry

Did you ask yourself about the relationship between the electronegativity and the polarity of some compounds like CH_4 methane gas, H_2S hydrogen sulphide?

Communication

Discuss with your classmates and your teacher the owner of classification idea into metals and nonmetals.

3 The metallic and nonmetallic property:

– Elements are divided into 4 main kinds, which are :

- Metals.
- Nonmetals.
- Semimetals (Metalloids).
- Inert gases.

Metals are characterized by that their outermost shells contain less than (4) electrons and tend to lose these electrons during the chemical reaction. To reach the nearest inert gas preceding them in the periodic table, forming positive ions.

- What do you expect the number of valenc shell electrons for nonmetals will be ?

....

- What kind of ions which are formed by nonmetals? ....
  What is your explanation? ....

- Some elements have both properties of metals and nonmetals which are known as metalloids.
- It is difficult to identify semimetals by knowing their electronic configuration due to the difference of numbers of the electrons in their valencies shells as shown in the table (2) :

Table (2)

Valency shell	Semimetal (metalloids)
3	$_{5}$B Boron
4	$_{14}$Si Silicon
5	$_{33}$AS Arsenic
6	$_{52}$Te Tellurium

Activity (4) Discovering the graduation of the metallic and nonmetallic properties in the periodic table.

Colour some cells of elements of the periodic table as shown in figure (4) as follows:

- Metals with red colour.
- Semi-metals with yellow colour.
- Nonmetals with green colour.
- Inert gases with blue colour.

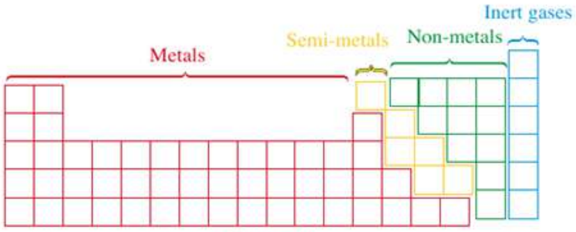


Figure (4)

Record your observation on the following questions.

- What is the kind of the element by which the period starts ? ....
- What is the kind of the element by which the period ends ? ....
- What is the kind of element which precedes the inert gas in each period ? ....

From the previous, we can conclude :

- The period starts with strong metal, as the atomic number increases in the same period the metallic property decreases gradually until we reach semimetals and then nonmetals start appear and as the atomic number increases, the nonmetallic property increases until we reach the strongest nonmetal in group 7A.
- Metallic property of the same group increases by the increase of the atomic number as we go from up to down (as in group 1A) due to the increase of the atomic size, while nonmetallic property decreases (as in group 7A) due to the decrease of electronegativity values.

Exercise (2)

Classify the elements of the third period in the periodic table according to their kinds. Use the modern periodic table fig. (3) on page (10 , 11).

....

The chemical properties of metals :

To know the chemical properties of matals partitipate, with your classmates in the co-operating group under the supervision of your teacher to do the following activity.

Activity (5) Discovering the chemical properties of metals.

Substances and tools :

- Magnesium strip.
- Water.
- A small piece of copper.
- Thin wire of iron.
- Test tube.
- Dilute hydrochloric acid.
- Two jars filled with oxygen.

Burnning of magnesium in oxygen
Figure (5)

Steps :

1. Put a piece of magnesium strip in the test tube, then add the dil. hydrochloric acid.
2. Repeat the previous step with copper instead of magnesium.
3. Heat another piece of magnesium strip till glowing and put it in the jar filled will oxygen fig (5).

4 Repeat the previous step with Mg instead of the thin wire of iron.

5 Add some water to the two jars with shaking.

Observations :

1 Do magnesium and copper react with the acid? How can you detect?

....

2 Does magnesium oxide dissolve in water ?

....

What is the effect of adding drops of violet litmus to the solution fig (6) ? ....

The effect of adding violet litmus to magnesium oxide solution
Figure (6)

3 Does iron oxide dissolve in water?

....

Conclusion :

1 Some metals react with dilute acids forming salt of acid and hydrogen gas (Fig. 7).

$$\underset{\text{Magnesium}}{Mg} + \underset{\text{Hydrochloric acid}}{2HCl} \xrightarrow{\text{Dil.}} \underset{\text{Magnesium chloride}}{MgCl_2} + \underset{\text{Hydrogen}}{H_2\uparrow}$$

magnesium reacts with hydrochloric acid.
Figure (7)

2 Metals react with oxygen forming metallic oxides which are known as basic oxides.

$$\underset{\text{Magnesium}}{2Mg} + \underset{\text{Oxygen}}{O_2} \xrightarrow{\Delta} \underset{\text{Magnesium oxide}}{2MgO}$$

3 Basic oxides which dissolve in water form alkalis:

$$\underset{\text{Magnesium oxide}}{MgO} + \underset{\text{Water}}{H_2O} \longrightarrow \underset{\text{Magnesium hydroxide}}{Mg(OH)_2}$$

Enrichment information (2)

A mixture of MgO , $MgCl_2$ and H_2O in making stones for making blades of knives which are very thin. (Sharpening knives).

- Metals are arranged descendingly according to their Chemical activity known as "chemical" activity series, the chemical activity of metals with water is different according to their position in the series as shown in the table (3).

Table (3)

K Potassium and Na Sodium	React instantly with water and H_2 evolves which burn with a pop sound
Ca Calcium and Mg Magnesium	React very slowly with cold water.
Zn Zinc and Fe Iron	React in high temperature with water vapor only.
Cu Copper and Ag Silver	Don't react with water.

Enrichment information (3)

High concentration of sodium ions Na^+ in the body causes high blood pressure so high blood pressure patients are recommended to decrease using table salt in foods.

Read and collect information about the importance of the different elements in food .

Life application | **Cleaning silver tools**

- Cover the bottom of a plastic plate with an aluminium paper (foil), whereas the bright surface is upward.
- Put on the aluminium paper the silver tools which you want to clean.
- Cover them by enough boiling water and then put (3) spoons of baking powder.
- Leave the tools for 15 minutes with stirring.
- Dry the tools after rinsing them with hot water.

Glittering silver plate
Figure (8)

The chemical properties of nonmetals :

To know the chemical properties of nonmetal elements, Participate with your classmates under the supervision of your teacher to do the following activity.

Activity (6) Discovering the chemical properties of nonmetals.

Substances and tools :

- Two pieces of coal (Carbon).
- Piece of sulphur.
- Two test tubes.
- Burning spoon.
- Dilute hydrocholric acid.
- A jar filled with oxygen.

Steps :

1. Put a piece of carbon in the test tube, then add dilute HCl to it.
2. Repeat the previous step with sulphur.
3. Heat the other piece of carbon in the burning spoon till it burns, then put it in the oxygen jar fig. (9).
4. Add some water in the jar with shaking.

Burning of carbon in oxygen
Figure (9)

Observations :

1. Does a reaction takes place between carbon or sulphur with the acid ?

....

2. What is the effect of adding drops of violet litmus dye to the formed solution in the jar figure (10) ?

....

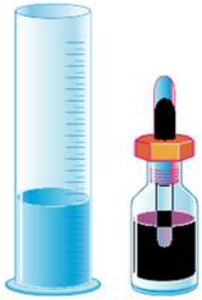
Conclusion :

- Nonmetals don't react with the acids.
- Nonmetals react with oxygen forming non-metal oxides. Most of them are known as acidic oxides.

$$\underset{\text{Carbon}}{C} + \underset{\text{Oxygen}}{O_2} \xrightarrow{\Delta} \underset{\text{Carbon dioxide}}{CO_2}$$

- The nonmetal oxide dissolves in water forming acids.

$$\underset{\text{Carbon dioxide}}{CO_2} + \underset{\text{Water}}{H_2O} \longrightarrow \underset{\text{Carbonic acid.}}{H_2CO_3}$$



The effect of adding violet litmus paper to the acidic solution
Figure (10)

Enrichment information (4)

Some elements oxides like aluminium oxide Al_2O_3 are called amphoteric oxides because they react with acids as basic oxides react with bases as acidic oxides and give in both cases salt and water.

A case for discussion **Graduating responsibilities, personal and societal decisions.**

– As the properties of elements are graduated in periods and groups, responsibilities and decisions are also graduated as well according to the position and responsibility of the individual in the society.

Discuss with your classmates under the supervision of your teacher this case, via these questions :

- What are the limits of your responsibilities at home, class, school, and the society?
- What is your concept about responsibility, what are its conditions, and what do we mean by graduating responsibility and decisions ?
- Does the refusal of your suggestions means a problem for you ?
- What is the nature of your personal relations with persons who have different points of view from yours.

Lesson summary

Graduation of the elements properties in the periodic table

In the same group	Property	In the same period
Increases by increasing the atomic number in the same group.	Atomic size	Decreases by increasing the atomic number in the same period.
Increases by increasing the atomic number in the same group.	Metallic property	Decreases by increasing the atomic number in the same period.
Decreases by increasing the atomic number in the same group.	Electronegativity	Increases by increasing the atomic number in the same period.
	Polar compounds	

- Electronegativity : Is the ability of an atom in the covalent compound to attract the bonded electrons to itself.
- Water and ammonia gas are from the examples of polar compounds.
- The properties of semimetals look like the properties of both metals and nonmetals.
- Chemical activity series : Is the descending arrangement of elements according to their chemical activities.

Questions on lesson 2

1 Put (✓) or (✗) in front of the following statements and correct the wrong ones:

(1) The atomic size increases by the increase of the atomic number. (   )

(2) Water and ammonia are from polar compounds. (   )

(3) Some alkalis dissolve in water forming bases. (   )

(4) The solutions produced from dissolving the non-metal oxides in water turn the violet litmus solution into red. (   )

2 Choose the correct answer between bracktes:

(1) Each period in the modern periodic table starts with .... element.
(metallic - semimetallic - nonmetallic - inert)

(2) In the same period, the element which has the highest electronegativity lies in group .... (0 - 7 A - 2 A - 1 A)

(3) When sodium reacts with water, ... gas evolves. (O_2 - CO_2 - H_2 - N_2)

3 What is meant by ....?

(1) Metalloids ....

(2) Chemical activity series ....

4 Explain the behaviour of the following elements with water:

(1) Iron .... (2) Silver .... (3) Potassium ....

5 Write the balanced chemical equations which express reaction of :

(1) Carbon dioxide with water.

....

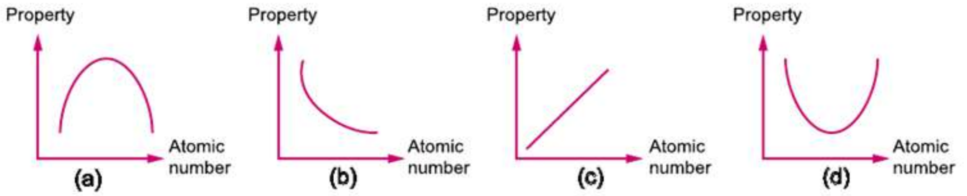
(2) Magnesium with dil. hydrochloric acid.

....

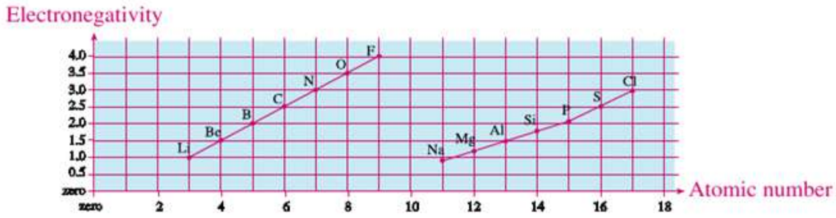
6 Which of the following figures repressents:

(1) Graduation of electronegativity property in the second period. (......................)

(2) Graduation of the atomic size in the third period. (......................)



7 Study the graph and then answer the following :



(1) Explain which one has more electronegativity .... metals or nonmetals ?

....

(2) Mention the values of electronegativity of the element which lies in :

(1) Period 2 and group 5 A ....

(2) Period 3 and group 7 A ....

8 Creative Thinking :

Write many uses for magnesium according to its following properties :

- Soft.
- Light.
- It glows by burning (forming white powder)
- It burns with a glowing light on heating it.

Activity

Draw a model of a building formed of ten floors, each floor has a right window and left window, then write on the righ windows the name 10 metals and on the left windows the name of 10 nonmetals.

Lesson 3

The Main Groups in the Modern Periodic Table

Lesson objectives :

At the end of the this lesson, the student should be able to:

1. Determine the valency of alkali metals.
2. Describe the behaviours of alkali elements in the chemical reactions.
3. Deduce the general properties of alkali metals.
4. Determine the valency of alkali Earth metals.
5. Describe the behaviour of alkali Earth metals in chemical reactions.
6. Deduce the general properties of alkali Earth metals.
7. Compare between the properties of alkali metals and alkali Earth metals.
8. Define halogen group.
9. Deduce the general properties of halogens.
10. Appreciate the importance of alkali metals and alkali Earth metals in our life.
11. Describe the properties of elements and their uses.
12. Appreciate the role of scientists and their efforts in studying elements and their uses in our life.

Points of the lesson

1. Alkali metals group.
2. Alkali Earth metals group.
3. Halogen group.
4. Inert gases group.
5. Properties of elements and their uses.

Included cases :

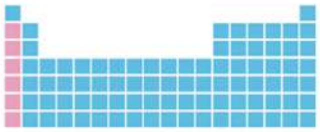
1. Making use of elements, resources and environmental ores.
2. Appreciating the role of science, scientists and scientific research in our life.

Some of the main groups in the periodic table are characterized by names as explained in this lesson.

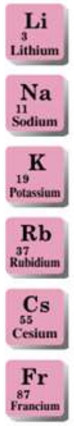
Description of some groups.

1 Alkali metals group (Group 1A) :

Observe and think carefully about the position of alkali metals in the periodic table (Fig.1) group 1A lies in the maximum left of the periodic table (Fig.2) and their metals are named alkali metals because they react with water forming alkali solutions.



The place of the alkali metals group in the periodic table.
Figure (1)



Alkali metals
Figure (2)

$$2\,Na + 2\,H_2O \longrightarrow 2\,NaOH + H_2$$

Sodium Water Sodium hydroxide Hydrogen

- What is the block of elements of group (1A)? ....
- What is the valency of alkali elements ? ....
- What is the behaviour of the alkali elements atoms in the chemical reactions ?
....
- Do alkali metals conduct heat and electricity ?
....

Identify the other properties of alkali metals, participate with your classmates under the supervision of your teacher to do the following activity.

Enrichment information (1)

*Although hydrogen gas exists in group A1, it is a nonmetal because its atom is remarkably small and it's a gaseous element.

*Search for the other similarities between hydrogen, metals and nonmetals.

Activity (1) Discovering the properties of alkali metals

Substances and tools :

- A piece of sodium.
- A piece of potassium.
- Filter paper.
- Basin.
- Water.

Steps :

1. Take out a sodium piece (pea size) from the kerosene in which sodium is kept. fig. (3)
2. Roll the sodium piece in the filter paper and put it carefully in the water basin.
3. Repeat the previous steps with potassium.

Figure (3)

Observations :

1. Why are Na and K kept under kerosene?
   ....
2. Which is stronger when reacting with water Na or K?
   ....
3. Do Na and K float on the surface of water or sink in it ? ....

> **Enrichment information (2)**
> Lithium is not kept under kerosene because it floats on the surface of it and it is immediately burns so it is kept in paraffin oil.

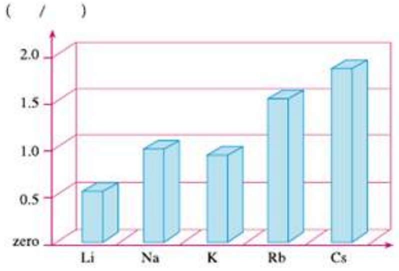
- From the previous, we can deduce the general properties of alkali metals as follows.

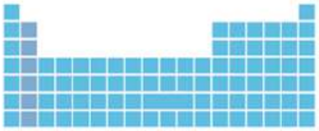
General properties of alkali metals :

Reaction of K with H_2O
Figure (4)

1. They are mono-valent elements because their outermost shells contain (1) electron.
2. They tend to lose their valency electron forming positive ions that carries one positive charge.
3. They are chemically active elements so they are kept under kerosene or paraffin to prevent their reaction with the moist air.
4. Their chemical activity increases by the increase of atomic size. Cesium (Cs) is considered as the most active metal in general.
5. They are good conductors of heat and electricity.
6. Most of them have low density (fig.6).

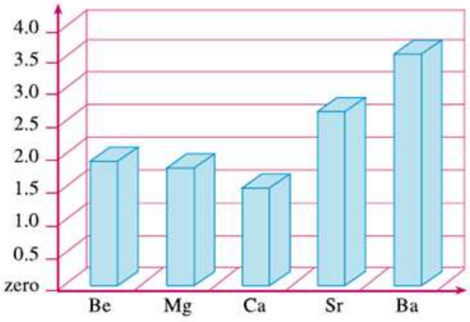
Reaction of Na with H_2O
Figure (5)





Location of alkaline Earth metals
in the periodic table
Figure (7)

Alkaline Earth metals



Density of alkaline Earth metals
Figure (9)

Enrichment information (3)

- Apricot and cauli - flower are rich in Mg which protects from heart diseases.
- Search for other foods rich in Mg to get benefits out of your metals.

To know the other properties of alkaline Earth metals, participate with your classmates under the supervision of your teacher to do this following activity.

Activity (2) Discovering the properties of alkaline Earth metals

Substances and tools :

- 3 basins of water.
- Bright Mg strip.
- A piece of calcium.
- A piece of barium.

Steps :

Put the Mg strip and two pieces of Ca and Ba in three basins of water (Fig. 10)

Figure (10)

Observations :

1. What do you conclude from the difference in the number of hydrogen bubbles evolved from reacting Mg, Ca and Ba with water ?

....

2. Why are the alkaline Earth metals not kept in kerosene as alkali metals ?

....

- From the previous, we can deduce the general properties of alkaline Earth metals :

General properties of alkaline Earth metals :

1. They are divalent elements because they contain 2 electrons in their outermost (valency) shells.
2. They tend to lose their valency electrons forming positive ions that carry two positive charges.
3. They are less active than alkali metals.
4. Their chemical activity increases by the increase of the atomic size because the loss of the valency electrons becomes easier.
5. They are good conductors of heat and electricity.
6. They have more density than alkali metals.

Exercise (2)

- Arrange the following elements descendingly according to their strength of metallic property :

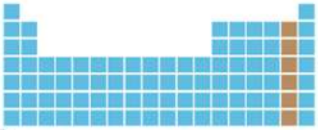
$_{11}Na$ – $_{12}Mg$ – $_{19}K$

Sodium Magnesium Potassium

....

3 Halogens group (7A)

Observe and think carefully about the position of halogens group in the periodic table (fig 11), the group 7A lies on the right side of the periodic table, it is one of (p) block groups, the nonmetals of this group are called halogens (Fig 12)



Lecation of halogens group in the periodic table
Figure (11)

Halogen elements
Figure (12)

i.e salts formations, because they react with metals forming salts.

$$2K + Br_2 \longrightarrow 2KBr$$

Potassium Bromine ⟶ Potassium bromide

Enrichment information (4)

*Chlorine is used in the manufacture of correctors substance, it is a very volatile liquid, on using, it becomes dry quickly, leaving a white substance on the paper surface.

Figure (13)

General properties of halogen elements :

1. They are mono-valent nonmetals ... Why ? ....
2. They exist as diatomic molecules F_2 , Cl_2 , ...
3. They are chemically active elements, so they do not exist individually in nature but they exist in chemical compounds, except astatine which is prepared artificially.
4. Each element in the group replaces the element below it in their solutions.

$$Cl_2 + 2KBr \longrightarrow 2KCl + Br_2$$

Chlorine Potassium bromide Potassium chloride Bromine

$$Br_2 + 2KI \longrightarrow 2KBr + I_2$$

Bromine Potassium iodide Potassium bromide Iodine

5. The physical state is graduated from the gaseous state (Flourine , Chlorine) to the liquid state (Bromine) to solid state (Iodine).

Exercise (3)

Write the equation of the reaction of Chlorine with sodium bromide.

....

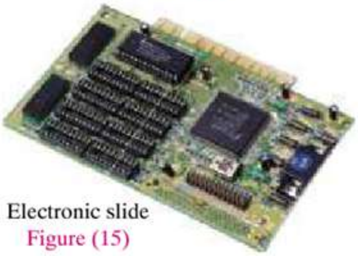
UNIT ONE

The properties of elements and their uses

The uses of elements or their compounds depend on their properties. You have studied before some of traditional uses for known elements. Now you will know the uses of some elements in the modern techniques.

Core of nuclear reactor
Figure (14)

1. Sodium is used in liquid state as it is a good conductor of heat. It is used also in transferring heat from inside the nuclear reactor to outside to obtain vapour energy required to generate electricity (fig. 16).
2. Silicon slides are used in manufacturing of computers because they are semi-conductors which their conductivity of electricity depends on the temperature.
3. Liquefied nitrogen is used in preservation of the cornea of the eye because it has a low boiling point (-196 ºC.)
4. The radioactive cobalt 60 is used in food preservation because gamma rays which come out from it prevent the reproduction of microbial cells without an effect on human.



Electronic slide
Figure (15)

Enrichment information (5)

The Egyptian Scientist Dr: Moustafa El-Sayed got the highest American medal in science for his efforts in the Nano technology in 29th September 2008.
(Nano) applying this technology in using gold in the treatment of cancer disease.

Dr: Moustafa El-Sayed
Figure (17)

Sterilization of meats by gamma rays
Figure (16)

Life Application | **Getting rid of the odour (smell) of a refrigerator**

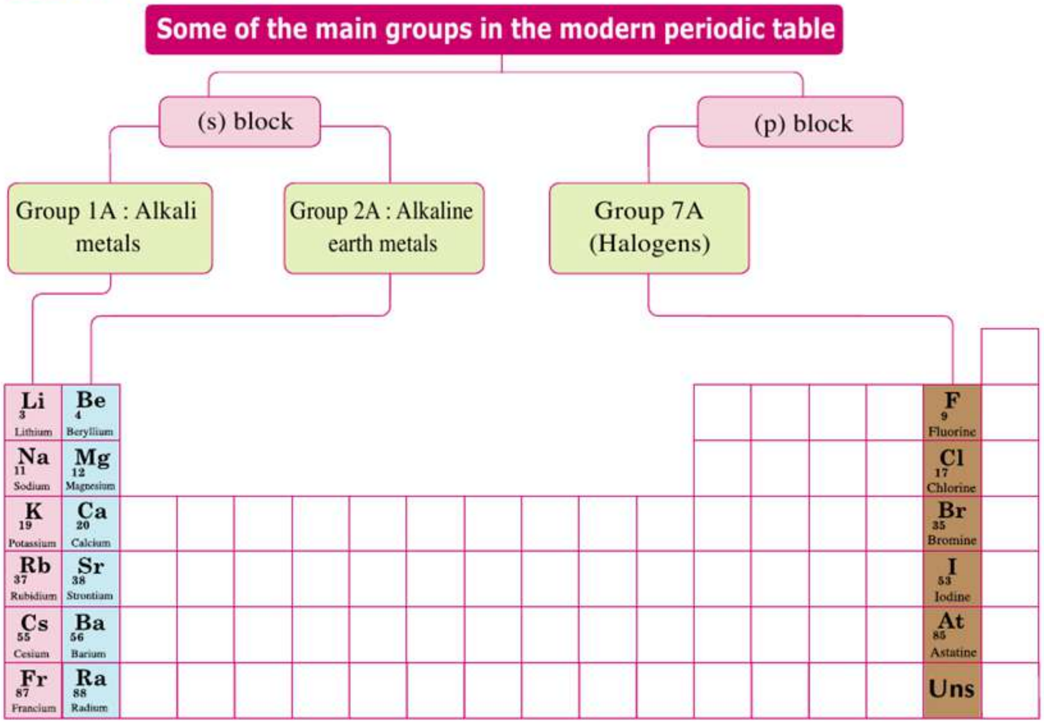
- Put in a yoghurt can a piece of coal which collects gases on its surface. Cover it and invert it.
- Make holes by a thin nail in the can base.
- Put the can in the refrigerator and change it every month.

A case for discussion (Friends)

You can identify the element properties from its group properties, by the same way you can identify the manner of the individual from his group manner (friends).

- Discuss with your classmates in class under the supervision of your teacher this case, these questions should be a part of the discussion.
- What are the advantages and disadvantages of your friends?
- Is it necessary that your friends are different in gender and religion ?
- Do you defend your friend either guilty or not ?
- What are your duties towards the rest of your friends?

Lesson summary



- Alkali metals are mono-valent while alkaline Earth metals are divalent.
- The density of alkaline Earth metals is higher than the density of alkali metals.
- In halogen group each element replaces the element which below it in its salt solution.

UNIT ONE

Questions on lesson 3

1 Choose the correct answer between brackets :

(1) .... is considered from halogen. (Sodium - Chlorine - Helium - Calcium)

(2) .... in its salt solution.

(Chlorine replaces bromine - Bromine replaces fluorine - Iodine replaces chlorine - Iodine replaces fluorine)

2 Give reasons for :

(1) Elements of group (1A) are known as alkali metal.

....

(2) Liquefied nitrogen is used in preservation of cornea of the eye.

....

3 Study the opposite figure which represents a section of the periodic table, then answer.

(1) What is the symbols which indicates the :

(a) Inert gases. (b) Alkali metals.

(c) Halogens. (d) Alkaline Earth metals.

The letters in the table don't represent the actual symbols of the elements

(2) What is the symbol which represents :

(a) The most active metal? (b) The most active nonmetal?

4 Mention one use for each of the following elements in modern technology :

(1) Liquid sodium ....

(2) Silicon ....

(3) Cobalt 60 ....

5 The opposite table explains the properties of three elements, mention the symbol which represents an element from :

(1) Alkali metal ....

(2) Halogen ....

(3) Alkaline Earth metals ....

Element symbol	Behaviour with water	Physical state	Electric conduction	Density (gm/cm^3)
X	dissolve	gas	bad conductor	0.003
Y	react	solid	good conductor	3.59
Z	react instantly	solid	good conductor	0.86

6 Creative Thinking:

Why lithium is not kept under kerosene but it is kept under paraffin oil?

Activity

By help of scientific refernces in your school library or peering at the internet to compare between alkali metals, halogen from point of : (atomic size, electronegativity - density - boiling point, melting point, atomic mass).

Lesson 4

Water

Lesson objectives

At the end of this lesson, The student should be able to :

1. Identify the importance of water and its sources.
2. Identify the bonds between its atoms and water molecules.
3. Identify the physical and chemical properties of water.
4. Explain the abnormality of physical properties of water.
5. Identify the electrolysis of water.
6. Explain why water is neutral.
7. Identify the water pollutants and their harms.
8. Identify how to keep water from pollution.
9. Appreciate the importance of water in our life.

Points of the lesson :

1. Importance of water and its sources.
2. Structure of water.
3. Properties of water.
4. Water pollution.

Included issues

1. Decrease of water and wars because of it.
2. Rationalization of consuming of water.
3. Nile water pollution.
4. Citizenship and protecting of water from pollution.

Can the living organisms live without water? Why?

-How do tourists travel to Luxor and Aswan fig. (1)?
-What is the main source of electricity in Egypt?
-The answer to the previous questions illustrates a side of importance for water.

Fig (1)

Importance of water and its sources

Participate with your co-operative group under the supervision of your teacher to do this following activity which shows the importance of water in the world.

Activity (1) Determining the importance of water in the world.

Observe and think carefully graph (2) and record your observations on the following questions.

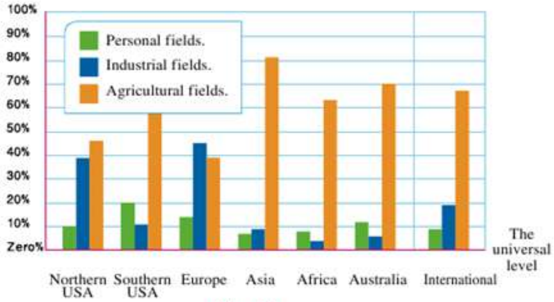


Fig (2)

1. Which continent uses more water in.
   (1) Personal fields.
   (2) Industrial fields.
   (3) Agricultural fields.
2. What are the fields in which water is consumed internationally?
   (1) More ratio ....
   (2) Less ratio ....
3. Is Africa classified as an industrial or an agricultural continent? Why?

....

Enrichment information (1)

Space journey Rofer 2003 illustrated the existence of frozen water on the surface of Mars Planet. Search in the scientific references and internet for different points of view about the possibility of existence of life on Mars surface.

From the previous , we can conclude that:

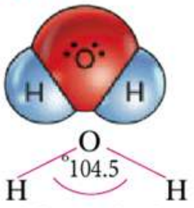
- The basic fields for using water in the world are: agriculture, industry, and personal uses. Most of fresh water is used in planting crops field. Fig (3)
- Sources of water in nature are : (rivers , seas , oceans) rain, wells and springs.

Fig (3)

Water structure :

You studied before that water :

Molecule is composed of the combination of one oxygen atom with two hydrogen atoms to form two single covalent bonds , the angle between them is 104.5º. Fig (4).

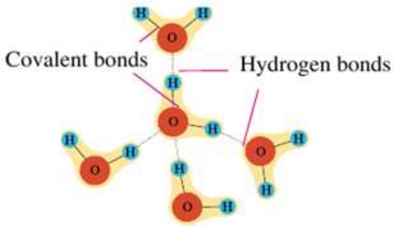


Water molecule

Fig (4)

Due to large electronegativity of oxygen compared with hydrogen, a weak electrostatic attraction is originated between water molecules which is called hydrogen bond. Fig (5).

Although these hydrogen bonds are weaker than the covalent bonds in the same molecules, they are considered to be the most important factors which are responsible for abnormality of water properties.



Bonds between atoms and molecules in water

Fig (5)

Properties of water :

Water is a unique substance due to its existence in three states at the ordinary temperature fig. (6) and it has many physical and chemical properties like :-

Three states of H_2O

Fig (6)

1 Good polar solvent :

Participate with your co-operative group under the supervision of your teacher to do the following activity.

Activity (2) Identifying water as a polar solvent.

2 Identifying water as a polar solvent.

* Three beakers. * Table sugar. * Table salt.
* Food oil, * Stirring spoon.

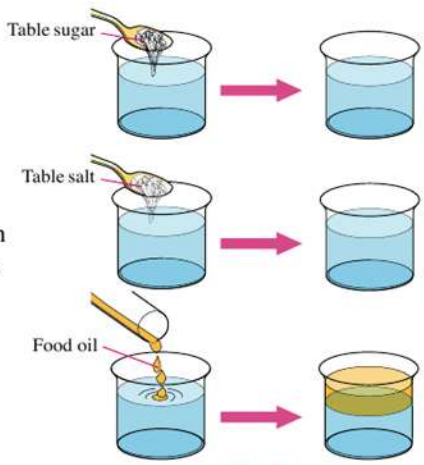


Fig (7)

Steps :

1. Fill the beakers with water.
2. Put in the first beaker a spoon of table sugar, a spoon of table salt in the second beaker and oil drops in the third beaker fig. (7).
3. Stir the contents of the three beakers.

Observations :

- What are substances which dissolved in water?

....

- What are the tastes the first solution and the second solution?

....

Conclusion :

1. Some substances dissolve in water, while others don't dissolve in it.
2. Water is a good polar solvent for most ionic compounds (as table salt) and for some covalent compounds (as sugar) which form hydrogen bonds with water.

2 Rising of its boiling and melting points.

According to the position of oxygen in group 6A of the periodic table, it was supposed that the boiling point of water is less than (100°C) and the freezing point is less than zero celsius. But the pure water in the normal atmospheric pressure boils at (100°C) and freezes at zero .... Why ?

The abnormality of the physical properties of water and from which high boiling and freezing point, is due to the presence of hydrogen bonds.

3 Water has low density when it freezes :

The density of water when it is in a solid state is lower than its density when it is in a liquid state because when the temperature decreases less than 4 $^{\circ}$C, the water molecules are collected by hydrogen bonds forming. large-sized hexagonal crystals with many spaces between them fig. (8). So ice floats on the surface of water in the frozen zones which make marine organisms be still alive.

Hexa crystal of ice
Fig (8)

Self inquiry

Did you ask yourself about the reason of explosion of closed bottles which completely filled with water in the freezers?

Communication

Discuss with your classmates under the supervision of your teacher the relationship between the density of water and explosion of completely filled bottles with water in the freezer.

Fig (9)

Exercise (1)

Two equal masses of pure water, one of them is at 20 $^{\circ}$C and the other is at 2 $^{\circ}$C Which of them has the larger volume?

....

Enrichment information (2)

Density of salt water is higher than the density of fresh water so swimming in the sea is easier than swimming in the poles.

Search for and investigate why the Dead Sea in Palestine was called by that name, write a report and keep it in the portfolio.

Life application | Dissolving the ice of the freezer quickly.

Turn off fridge, put a hot water container in the freezer and close the fridge.

(you can use the hair dryer to direct a hot air current to ice and it melts quickly).

4 Rising of its latent heat

Rising of water latent heat , makes it resists the change from a state to another. This property makes water one of the most important liquids used in extinguishing fires, as it consumes a large amount of heat of combustion media during its vaporization process.

Water extinguishes fire
Fig (10)

5 Rising of its specific heat

The high specific heat of water makes it absorbs or loses a large amount of heat without changing its temperature therefore the temperature of human body doesn't change by changing the atmospheric temperature.

Enrichment information (3)

* The latent heat of fusion :
It is the amount of heat energy needed to change 1 kg. of ice from solid state to liquid state without changing its temperature.
* The latent heat of vaporization :
It is the amount of heat energy needed to change 1 kg of water from liquid state to the vapour state without changing its temperature.
* The specific heat :
It is the amount of heat energy needed to raise the temperature of 1 kg of a substance by 1°C.

6 Weakness of its ionization

Ionization: is the process of converting the molecules of some covalent compounds into ions. The pure water is considered from weak ionized substances. Water is neutral because when it ionizes , it gives equal numbers of positive hydrogen ions.

H^+ which is responsible for the acidic properties and negative hydroxide ions.

$(OH)^-$ which is responsible for the basic properties.

$H_2O \longrightarrow H^+ + OH^-$

7 It has neutral effect on both of litmus papers

Participate with your classmate to do the following activity which explains the neutralization of water.

Activity (3) Discovering the neutralization of water

Substance and tools

* Basin containing pure water.
* Two litmus papers (red - blue).

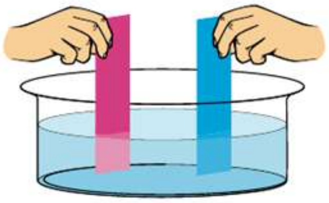


Fig (11)

Steps :

What is the effect of putting both of litmus papers in pure water ? (Fig. 11)

....

From the previous we conclude that

The pure water has a neutral effect on both of litmus papers (red and blue).

8 Its resistance to analysis

At normal conditions, water isn't analyzed into two elements or by the effect of heat, it helps to keep water solutions in the cells of living organisms generally.

You can participate with your classmates to do this activity (Electrolysis of water).

Activity (4) Investigating the process of electrolysis of water.

Substances and tools

* A round piece of foam plate.
* Sodium carbonate spoon.
* Empty plastic bottle.
* Battery 4.5 v.
* Two test tubes.
* Two pencils.
* Water.
* Two copper wires.
* Wax gun.

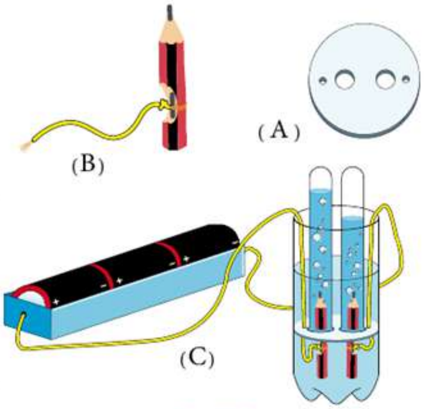


Fig (12)

Steps :

1. Cut the top of the plastic bottle and fill it to its middle with water and dissolve sodium carbonate in it.
2. Make a hole in the foam as in fig. (12).
3. Remove carefully the wooden part of the two pencils until graphite appears, coil the copper wire around them as in fig. (12 B). Cover the bared part by wax gun.
4. Form the apparatus as in fig. (13 C) and close the circuit for 10 minutes.

Observations :

1 What is the ratio between two volumes of evolved gases over the negative pole (Cathode) and the positive pole (Anode)?

....

2 What is the effect of approaching a glowing splint to the gas formed at:

(1) Cathode ....

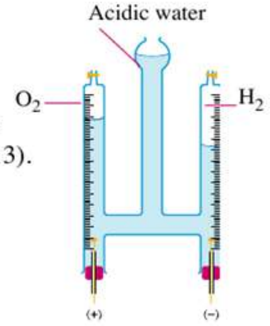
(2) Anode ....

Conclusion :

(1) Acidified water decomposes by electricity into two elements hydrogen and oxygen and the volume of hydrogen is twice the volume of oxygen.

$$\underset{\text{Water}}{2H_2O} \xrightarrow{\text{Electrolysis}} \underset{\text{Hydrogen}}{2H_2\uparrow} + \underset{\text{Oxygen}}{O_2\uparrow}$$

(2) Hydrogen evolves above the cathode, while oxygen evolves above the anode. Hoffman's voltameter is used in electrolysis of water fig. (13).



Hoffman voltameter apparatus

Fig (13)

Exercise (2)

On the electrolysis of a certain volume of acidified water by dilute sulphuric acid, the volume of evolved oxygen gas was 2 cm^3.

What is the volume of hydrogen gas evolved?

....

Water Pollution

The continuous increase in industrial and agricultural activities that leads to water pollution. You can participate with your co-operative group to get a sample of swamp water to do the following activity which illustrates the concept of water pollution.

Activity (5) Discovering the concept of water pollution

Substances and tools

* Three glass containers. * Tap water.
* An artificial liquid detergent.
* An agricultural fertilizer.
* Water containing green algae (green water).

Fig (14)

Steps :

1. Fill the glass containers with tap water.
2. Add an amount of green water to each.
3. Add two spoons of artificial detergent to the first container and two spoons of fertilizers to the second container and leave the third container without additives.
4. Put the three containers after covering them in a sunny place for some days. (Fig. 14)

Observations :

In which container :

* Algae grow faster ....
* Algae grow slower ? ....

Conclusion :

1. Pollution of water by fertilizers leads to fast growth of algae, which lead to the decrease of the amount of oxygen dissolved in water.
2. Pollution of water by detergents leads to slow growth of algae, which lead to the decrease of the amount of available food for fish.

From the previous activity, we understand that :

Addition of any substance to water causes a continuous gradual change in its properties affecting the health and life of living organisms on which they depend. It is called water pollution.

Enrichment information (4)

* Drinking water doesn't depend on its colour or its odour but it depends on the lab analysis according to the standards that are put by the world health organization which is a guide for different countries.
* Search for standards of world health organization about drinking water and write a full summary of it.

Water pollutants and their harms

- Environmental pollutants are divided generally into two kinds :

* Natural pollutants: Their sources are natural phenomena like occurence of volcanoes fig. (15), lightning accompanied by thunderstorms and death of living organisms.
* Artificial pollutants : Their sources are the different human activities.

Volcanic activity
Fig. (15)

Exercise (3)

Mention many examples for water pollutants whose sources are human activities.

....

Water pollution is divided into (4) main parts

1 Biological pollution:

It is originated from mixing of human and animal wastes with water fig (16) and that causes many diseases such as Bilharzia, typhoid and that hepatitis.

Polluted Nile is due to animal stools

Fig (16)

2 Chemical pollution:

It is originated from discharging of factories wastes fig.(17) and sewage in canals , rivers , and seas fig.(18) the increase of some elements concentration causes great harms. Eating fish which contains high ratios of lead causes the death of brain cells, drinking water which contains high ratio of mercury leads to blindness. Arsenic increases the rate of infection by liver cancer.

Discharging of factories wastes in the canals

Fig (17)

3 Thermal pollution:

It is originated from the rise of temperature of some marine zones which use water for cooling the nuclear reactors which destroy the marine organisms found in them due to separation of dissolved oxygen in water fig. (19)

Discharging sewage in canals

Fig (18)

4 Radiant pollution:

It is originated from leakage of radioactive substances from the nuclear reactors or dumping of the atomic wastes in seas and oceans.

Fig (19)

Protection of water from pollution :

- Many behaviours and percautions for protecting water from pollution in Egypt :

1. Getting rid of the phenomenon of discharging of sewage, factories wastes and dead animals in rivers or canals.
2. Development of water purification stations (fig. 20) and making periodic analysis to determine the rate of its validity for drinking.
3. Spreading environmental awareness among people about protection of water from pollution.
4. Disinfecting drinking water tanks above buildings periodically. (fig. 21)
5. Don't store the tap water in empty plastic bottles of mineral water because they react with chlorine gas which is used in disinfecting of water, so the rate of cancer infection increases.

Water purification station

Fig (20)

Water tank

Fig (21)

A case for discussion | **Water = Life**

Wars may break out due to fresh water, at the same time some people don't keep water resources well. Discuss with your classmates under the supervision of your teacher this case. Use these questions in the discussion.

1. Did you try the feeling of being thirsty?
2. What is your role and responsibility for the unfixed water tap at school or at home?
3. What do you feel about when you see victims of drought in Africa in the broadcast?
4. What should you do when you find a person throwing wasteing in the Nile?
5. What are your suggestions for keeping water of the Nile?

Lesson summary :

Water

Its sources
wells - (rivers - seas - oceans) - rains

Fields of its uses :
* Personal field.
* Industrial field.
*Agricultural field.

Chemical structure :
* Water molecule. H_2O
* Covalent bonds .
* Hydrogen bonds.

Pollutants:
* Biological pollutions.
* Chemical pollution.
* Thermal pollution.
* Radiant pollution.

* Important properties
* Good polar solvent :
- High boiling and freezing point.
- Low density on cooling-latent heat is high
- Ionization is weak and it is neutral for both of litmus papers.
- Resistant to analysis.

* Hydrogen bond is considered one of the most important factors that are responsible for the abnormality of water.
* Hoffman's voltameter apparatus is used in the electrolysis of water.

Questions on lesson 4

1 Choose the correct answer between brackets :

(1) All of the following are from the properties of water except .... (neutral on both litmus paper / analysis by heat / increase in volume on heating / polar compound)

(2) There are .... bonds between water molecules.
(hydrogen / covalent / ionic / metallic)

(3) A lake contains: mineral salts, oxygen , fertilizer , animal wastes , green algae.
How many pollutants are in it ? (1 / 2 / 3 / 4)

(4) A liquid boils at 100 ºC, what is the other property which affirm it is a pure water ?
(Sugar dissolves in it / when it freezers , denstiy decreases / neutral on both litmus paper / it evaporates on heating)

2 Give reasons for :

(1) Presence of hydrogen bond between water molecules.

....

(2) Pure water doesn't affect litmus paper dye.

....

(3) Although sugar is a covalent compound , it dissolves in water.

....

3 What are the results of ?

(1) Water is polluted by the wastes of Man and animal.

....

(2) Storing water in plastic bottles of mineral water.

....

4 Choose from (B) what suits (A) column :

(A)	(B)
Probably harm	Responsible pollutant
(1) Death of brain cells.	(1) Lead.
(2) Cancer of liver.	(2) Sodium.
(3) Blindness.	(3) Mercury.
	(4) Arsenic.

UNIT ONE

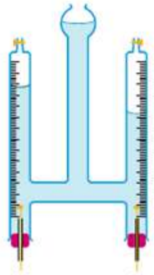
5 The opposite figure illustrates Hoffman voltameter used in the electrolysis of water.

(1) Write the chemical equation which illustrates the chemical reaction.

....

(2) What is the volume of gas which burns with a pop sound when you approach a glowing splint to it if the volume of the other gas is 6 cm^3?

....



6 Nuclear reactors cause thermal and radiant pollution :
Explain this phrase.

....

7 How do we keep water from pollution?

....

8 Creative thinking: What do you expect for the River Nile pollution after 50 years?

....

Activity

Participate with your classmates under the supervision of your teacher to make a journey to the nearest station of purification of water and write a report about the different steps for purification.

Unit Review

1 Choose:

(1) Scientist .... discovered the main energy levels in the atom.

(Bohr / Mendeleev / Mosely / Hoffman)

(2) Sodium oxide from .... oxides. (amphoteric / acidic / nonmetallic / basic)

(3) All the following elements from semimetals except for ....

(tellurium / silicon / boron / bromine)

(4) The strongest metal lies in the .... group. (2A / 1A / 1B / 7A)

2 What is meant by ?

(1) Chemical activity series? ....

(2) Water pollution? ....

(3) Semimetals? ....

3 How can you differentiate between magnesium oxide and sulphur oxide?

....

....

4 What is the importance of ?

(1) Liquefied nitrogen: ....

(2) Sodium : ....

(3) Water : ....

5 Give reasons for :

(1) The use of radioactive Co 60 in food preservation.

....

(2) Elements of the same group have similar properties.

....

(3) The boiling point of water is high.

....

(4) Alkali metals are kept under kerosene in the lab.

....

6 What is the effect of the following on the water environment?

(1) Drainage of factories wastes in rivers and seas.

(2) Using of rivers and seas water as a renewable source for cooling the nuclear reactor.

(3) Mixing of animal and Man wastes with water.

7 The opposite figure represents a part of the periodic table , symbols represent some elements , study the figure then answer.

(1)What kind of : X - R - M - D elements.

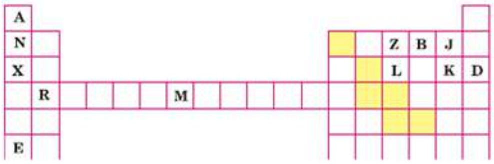
....

....

(2) Mention the atomic number of element B.

....

....



(3) What do the shaded area represent?

....

(4) Mention the symbol which represents.

* Most active element in group 1A. ....
* The higher in the electronegativity in the third period..
* The largest size element in the second period...

Cogitation and self evaluation :

Dear student : After you finished your study of unit one, record you point of view by the answer of the following questions.

(1) What are the subjects which you get benefit on studying this unit?

....

(2) What are the wrong concepts and scientific phenomena you have and their treatment and their correction during studying of this unit?

....

(3) What are the difficulties which you faced during studying this unit and performing the activities?

....

(4) What are the subjects which you studied and you prefer to review its content to match your understanding level?

....

(5) What are the subjects do you suggest to study which are not included in this unit.

....

Unit 2

The Atmosphere and protecting Planet Earth

Unit lessons :

Lesson 1 : The Atmospheric Layers.

Lesson 2 : Erosion of Ozone Layer and Global warming.

Learning Resources :

1. The air – stiv barkar Dar El-Farouk
2. The air – Dr. Abd El Baset Elgamal – Safer
3. Weather disasters – El Dar El hadesa For publishing and distribution
4. Climate Crisis – Nigel Hocks – Academia

Unit objectives

By the end of this lesson, the student must be able to:

1. Know the concept of atmospheric pressure and layers of atmospheric envelope.
2. Interpret the change of atmospheric pressure with changing height above sea level.
3. Appreciate the importance of instrumets that measure atmospheric pressure.
4. Describe the characteristics of atmospheric layers.
5. Compare among the characteristics of atmospheric layers.
6. Conclude the importance of each layer of atmosphere.
7. Recognize the importance of studying each layer of the atmosphere.
8. Appreciate the role of scientist to reach devices measuring atmospheric pressure.
9. Know the composition of Ozone gas.
10. Conclude the steps of Ozone formation.
11. Aware of the importance of the Ozone layer of the human and living organisms.
12. Desribe hurmful effects for pollutants of Ozone layer.
13. Determine ways te protect Ozone layer.
14. Follow up the procedures and solutions, to the problems of ozone depletion.
15. Describe the global warming phenomenon and greenhouse effect.
16. Identify greenhouse gases.
17. Explain increase the temperature of atmospheric envelope of earth.
18. Determine the negative effects resulted from the rising temperature of the earth's atmosphere.
19. Follow up the percedures and solution to problems of global warming phenomenon.
20. Appreciate greatress of God in providing the atmosphere and air for living organisms.

Lesson 1

The Atmospheric Layers

Lesson objectives :

By the end of this lesson, the student must be able to:

1. Know the concept of atmospheric pressure.
2. Interpret the change of atmospheric pressure with changing height above sea level.
3. Understand the change of atmospheric pressure with changing height above sea level.
4. Appreciate the importance of instruments that measure atmospheric pressure.
5. Mention the importance of altimeter.
6. Know atmospheric layers.
7. Mention the characteristics of atmospheric layers.
8. Compare among the characteristics of atmospheric layers.
9. Determine the importance of each layer of the atmosphere.

Lesson subjects :

1. Atmospheric pressure.
2. Change of atmospheric pressure with height above sea level.
3. Atmospheric layers.

Included issues :

1. Instability of weather.
2. Laws and rules of the internet communication.

UNIT TWO

Atmospheric pressure

The Earth is surrounded by a gas envelope that rotates with it about its axis, and extends 1000 km above sea level. It is known as atmosphere.

The weight of air column of an atmospheric height on a unit area is called air pressure or atmospheric pressure. It is measured in a unit called a bar. The bar equals 1000 millibar (mbar).

Enrichment Information (1)

* The internal pressure of human body equals the atmospheric pressure.
* How does climbing heights or diving deep in ocean affect eardrum?

Normal atmospheric pressure at sea level equals 1013.25 millibar.

Change of atmospheric pressure with change in height above sea level :

Share your cooperative group in performing the following activity:

Activity (1) Proving how atmospheric pressure changes with changing height above sea level.

Materials and tools:

- 4 big books.
- 3 pieces of modelling clay with different colors.
- 6 plastic sheets.

Figure (1)

Procedure:

1. Form the modelling clay into 3 identical balls.
2. Put clay balls between the plastic sheets and the books.

Observations :

1. Do the balls' shape change? Why? ……………………………………………………
2. Which ball did change more? Why? ……………………………………………………
3. Which ball did change less? Why? ……………………………………………………

As the weight (pressure) of books increases due to their number (height), the change in balls' shape increases.

Likewise, atmospheric pressure increases as the height of air column increases.

It was found that :

50% of atmosphere mass occurs in the area between sea level and 3 km high. Meanwhile, 90% of its mass is concentrated in the first 16 km above sea level.

- What is the effect of the height decrease of an atmospheric air column on its weight?

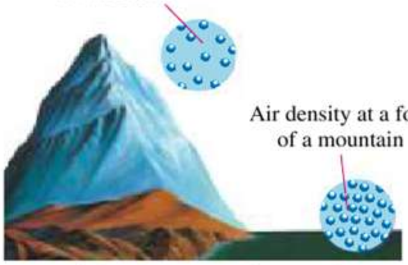
……………………………………………………

……………………………………………………

- What is the effect of rising up above sea level on the air density?

……………………………………………………

……………………………………………………



Air density at a top of mountains
Figure (2)

Exercise (1)

In airplanes, an altimeter is used to determine the elevation of the navigation based on the atmospheric pressure at this level.

Choose the values of atmospheric pressure that suite the elevations above sea level (Table 1).

Altimeter in aeroplanes
Figure (3)

Table 1

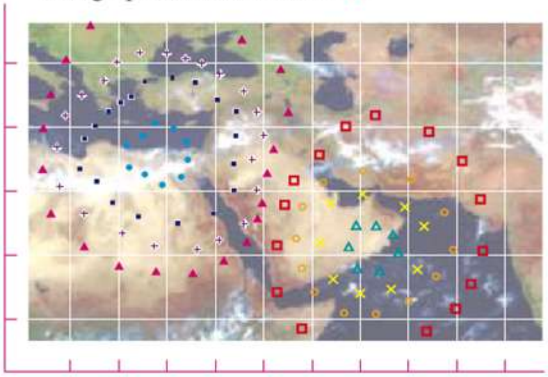
Elevations above sea level (km)	Atmospheric pressure (millibar)
(1) 3 km	203 m bar
(2) 6 km	731 m bar
(3) 9 km	323 m bar
(4) 12 km	503 m bar

Enrichment Information (2)

The greatest atmospheric pressure that ever recorded so far on the earth's surface was in January 1968 in Siberia when it reached 1080 millibar. On the other hand, the lowest pressure was 870 millibar where it is recorded in the eye of the tropical hurricane "typhoon" in 1979.

Exercise (2)

Use a curved line to connect the points indicating equal pressure (Isobar) (fig. (4) to make a surface pressure map. Then mark the center of low pressure with letter L and the center of high pressure with letter H.



Atmospheric pressure map Figure (4)

Atmospheric pressure (mbar)	Symbol	Atmospheric pressure (mbar)	Symbol
1010	◘	990	•
1012	○	995	■
1015	×	1000	+
1020	△	1005	▲

Real life application | Barometer to determine today's weather

The possible day's weather can be estimated directly with an instrument known as Aneroid (fig. 5). It is a type of barometers, which is used to measure atmospheric pressure.

Aneroid
Figure (5)

Layers of atmospheric envelope

Atmospheric envelope is divided into several layers according to the changes in the atmospheric pressure and temperature they are illustrated by the following activity.

Activity (2) Recognizing atmospheric layers:

Atmospheric layers
figure (6)

Study and investigate figure (6) and write down your observatiosn after answering the following questions:

(1) How many layers are in the atmosphere?

....

(2) Name these layers, starting from sea level.

....

(3) What is the name of the surface area at which the temperature is constant between:

(a) First and second layers?

....

(b) Second and third layers?

....

(c) Third and fourth layers? ....

First layer : Troposphere

Troposphere is the first layer of the atmosphere. It means the disturbed layer where most of the weather changes occur in this layer.

To know the characteristics of the troposphere, share your working group in performing the following activity:

Activity (3) Concluding the characteristics of the troposphere.

Investigate figure (7) carefully with the help of your group and conclude the characteristics of the troposphere by answering the following questions:

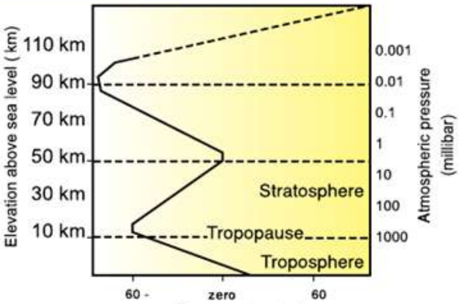


Figure (7)

(1) What is the approximate thickness of the troposphere layer? ....

(2) What would happen to the temperature as going up in the atmosphere?

....

(3) What is the value of the atmospheric pressure at the end of the layer? ....

(4)What is the value of the temperature at the end of the layer? ....

Enrichment Information (3)

Troposphere thickness is 13 km. It is an average thickness as it is about 8 km above poles and 18 km at the equator.

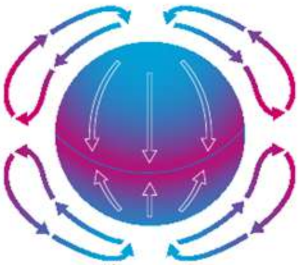
Characteristics and importance of the troposphere:

1. It extends 13 km above sea level to the tropopause.
2. As we go up, the temperature decreases by a rate of 6.5 ºC per 1 km until it reaches the lowest value of about (-60 ºC) at tropopause.
3. Atmospheric pressures decreases as we go higher, where it reaches about 0.1 bar of the normal pressure at sea level.
4. It contains about 75% of the atmosphere mass. This explains why all atmospheric phenomena like rain, wind, clouds …. etc (fig.8) that forms the weather conditions, and consequently up the climate, occurs in this layer and affects the activities of living organisms.

Clouds and winds
Figure (8)

5 It contains about 99% of the atmospheric water vapour, which organizes the earth's temperature.

6 The air movement in this layer is vertical (fig. 9) as the warm air currents go up and the cold currents go down.



Air currents
Figure (9)

Self inquiry

Have you ever asked about the characteristics of the hieghts and low areas, relative to sea level, in Egypt ? Where they are?

Communication

By the guide of your teacher, discuss with your classmates, the advantages and disadvantages of living in these areas?

Exercise (3)

If the temperature at the base of mount Everest is 20.6 ºC, how much is the temperature at its top if the mountain height is 8862 m?

Solution:

Height (km) = ……………………..…..

The decrease in temperature = height (Km)   6.5 = ...………

Temperature at the top = temperature at the base – decrease in temperature ....

Second layer: Stratosphere

Stratosphere is the second atmospheric layer, which is also called ozone atmosphere Why?

Activity (4) Concluding the characteristics of the Stratosphere.

Investigate figure (10) carefully with the help of your group and conclude the characteristics of the stratosphere by answering the following questions :

1 What is the name of the two areas where between them stratosphere is located?

....

....

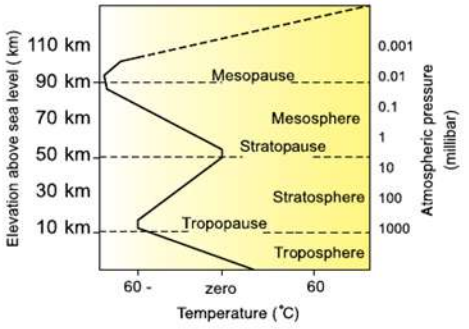


Figure (10)

2 What is the thickness of the stratosphere? ....

3 What would happen to the temperature if going higher?..

4 What is the atmospheric pressure value at the end of the layer? ....

Characteristics and importance of the stratosphere:

1 It extends from tropopause (13 km above sea level) to the stratopause (50 km) with thickness of 37 km.

2 At the lower part, the temperature is constant and measure (– 60º C), then increases gradually until it reaches 0º C at the end of the layer. This is due to the absorption of ultraviolet radiation (emitted from The Sun) by the ozone layer that is present in the upper part of the layer.

3 The atmospheric pressure decreases on going higher where it reaches the smallest value (0.001 bar of the normal pressure at sea level) at the end of the layer.

4 It contains most of the atmospheric ozone which is concentrated between 20 - 40 km above sea level.

5 The lower part does not contain clouds or suffer from any weather disturbances. The air moves in this part horizontally, making it suitable for flying planes (fig. 11)

Flying in the stratosphere
Figure (11)

Third layer: Mesosphere

– Mesosphere is the third atmospheric layer.

– It means the middle layer. It is the coldest layer.

Enrichment Information (4)

Although meteors burn in the mesosphere, spaceships don't burn during passing through it as they have a conical front that disperses heat and tails made of an insulated material.

Characteristics and importance of the mesosphere:

1 It is extended from the stratopause (50 km above sea level) to the mesopause (85 km) with thickness of about 35 km.

2 Temperature decreases with height rate until reaches (– 90º C) at its end.

3 This layer is much vacuumed as it contains only a limited amount of helium and hydrogen gases.

4 Meteors are formed in this layer and burnt due to friction with air molecules (fig. 12)

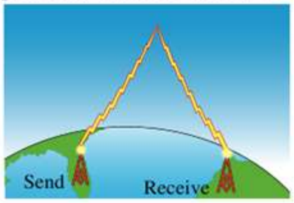
Formation of meteors in the mesosphere
Figure (12)

Fourth layer: Thermosphere

Thermosphere is the fourth atmospheric layer. It means the heated layer as it is the hottest layer of the atmosphere.

Characteristics and importance of the thermosphere :

1. It extends from the mesopause to 675 km above sea level with a thickness of about 590 km.
2. Temperatures increase rapidly with going higher until it reaches about 1200º C.
3. Its upper part contains charged ions. The distribution of the charged ions extends until 700 km above sea level; in a part known as ionosphere.



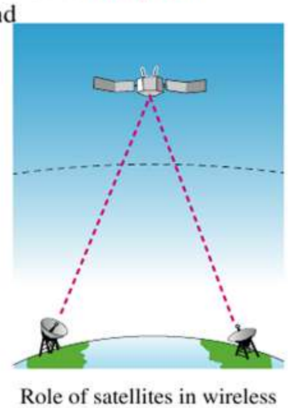
Reflection of radio waves from the ionosphere
Figure (13)

- Ionosphere plays an important role in wireless communication and broadcasting as it reflects radio waves that are transmitted by communication centers and radio stations (fig. 13).
- Ionosphere is surrounded by two magnetic belts known as Van Allen Belts (fig. 14). These two belts play an important role in dispersing the harmful charged cosmic radiation away from the Earth. In the same time, they cause the Aurora phenomenon, which appears as brightly coloured light curtains at both the North and South poles of the Earth (fig. 15).

Aurora phenomenon Figure (15)

Van Allen Belts
Figure (14)

The atmosphere is inserted into the outer space via an area known as the Exosphere. This is the area where satellites float around the Earth (fig. 16) and transmit weather condition information and TV prvograms.


Role of satellites in wireless communication
Figure (16)

Enrichment Information (5)

* The Egyptian Satellite (Nile sat) transmits a number of different educational channels that you can watch on digital space channels.
* Record the dates of broadcasting of the educational material you study on the educational channels during a week and distribute them among your classmates to benefit from them.

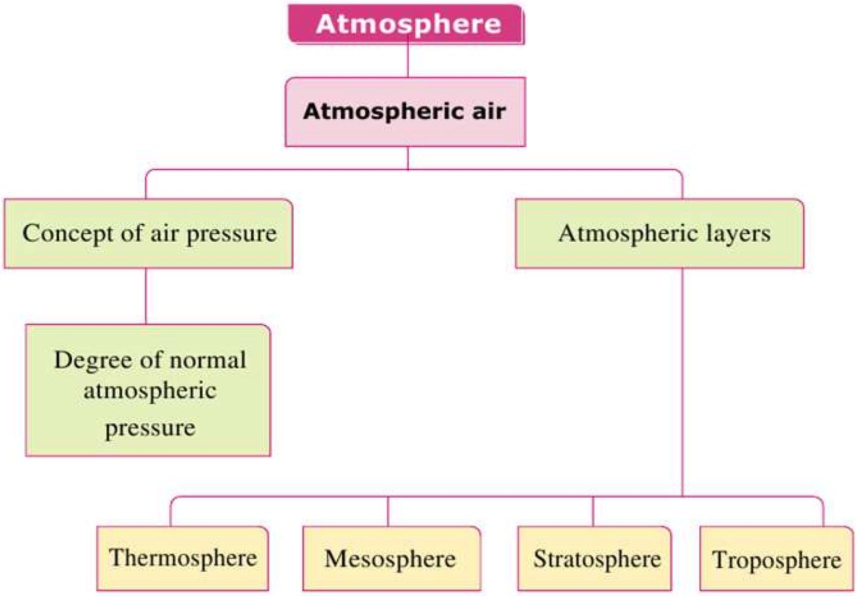
A case for Discussion | **Space channels**

Space channels use satellites to transmit media and commercial materials. Some of them is useful and acceptable. Others contradict morals and religion principles.

Guided by your teacher, discuss this issue with your classmates. Use the following questions as part of a discussion subject:

- What are the channels that you watch? Why?
- What are the interesting programs that you watch in these channels?
- Does one of your friends watch channels that transmit obscene material?
- How do you deal with such channels in a civilized manner?

Lesson summary



- Atmospheric pressure is the weight of air column on a unit area.
- Normal atmospheric pressure (at sea level) equals 1013.25 millibar.
- Temperature in troposphere decreases on getting higher, the rate of decrease is 6.5º C/1km.
- The ionosphere is surrounded by Van Allen Belts which are responsible for dissipating harmful cosmic rays away from the Earth.

Review of lesson 1

1 Choose the correct answer from statements between brackets:

a. Normal atmospheric pressure equals ……………. millibar.
(1013.25 / 76 / 1.013 / 760)

b. ………… is located between stratosphere and mesosphere.
(Tropopause / Stratopause / Mesopause / Thermopause)

c. Meteors burn in ……………
(mesosphere / ionosphere / exosphere / stratosphere)

2 Give reasons for :

a. The lower part of the stratosphere is suitable for flying airplanes.
……………………………………………………………………………………………..…..

b. Ionosphere is important for radio stations.
……………………………………………………………………………………………..…..

3 Mention the importance of each of the following:

a. Van Allen's Belts ……………………………………………………………...…………

b. Altimeter ………………………………………………………………………………………

c. Satellites ……………………………………………………………..…………………..

4 Arrange the atmospheric layers according to the temperature changes occurring in them.

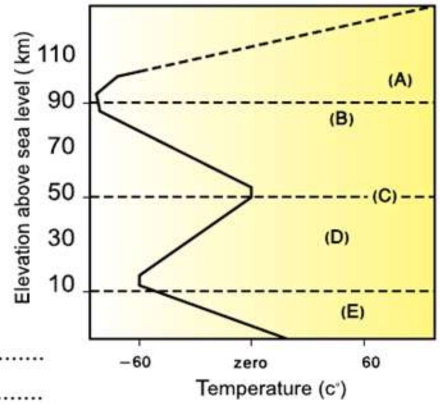
…………………………………………………………………………............………………………..

5 What is meant by each of the following ?

a. Atmospheric pressure.
……………………………………………

b. The aurora phenomenon.
………………………………........……

6 The opposite figure exhibits the temperature changes in the atmospheric layers :



(1) Replace the letters on the drawing with suitable labels ....……………...………
…………...

(2) Which layer is :
The highest in temperature …...............................
The least in temperature ……….........................

7 Creative thinking:

Mention as many aspects as you can show similarity between the ionosphere and the house wall.

………………………………………………………………………………………………………
………………………………………………………………………………………………………

Activity

In less than 10 lines, write an editorial about the effect of getting higher above sea level on the life of Man; using magazines, periodicals, encyclopedias, and school library or internet sites.

Lesson 2

Erosion of Ozone Layer and Global Warming

Lesson objectives :

By the end of this lesson, the student must be able to :

1. Know the composition of Ozone gas.
2. Conclude the steps of ozone formation.
3. Appreciate the importance of Ozone Layer.
4. Describe the harmful effects of short- and medium-wave length ultraviolet radiation on the Ozone Layer.
5. Mention the pollutants of Ozone Layer.
6. Determine ways to protect Ozone Layer.
7. Describe the global warming phenomenon and the greenhouse effect.
8. Identify greenhouse gases.
9. Interpret the rising temperature of the earth's atmosphere.
10. Determine the negative effects resulted from the rising temperature of the earth's atmosphere.
11. Follow up the procedures and solutions to the problems of erosion of the ozone layer and global warming.

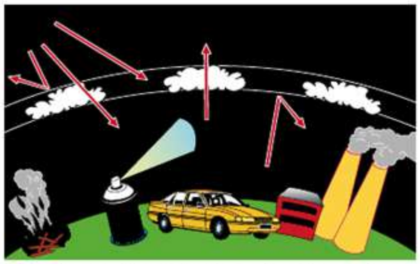
Main subjects :

1. Composition of Ozone gas.
2. Importance of Ozone Layer.
3. Erosion of the Ozone layer (ozone hole).
4. Pollutants of Ozone Layer and their effects.
5. Protecting the Ozone Layer.
6. Greenhouse effect and global warming phenomena.
7. Negative effects due to global warming.

Included cases :

1. Erosion of the Ozone Layer (ozone hole).
2. Impacts of science and technology on the society.
3. Greenhouse effect phenomenon.
4. World coalition.
5. Managing energy consumption.

- Since the mid 20th century, erosion of the Ozone Layer depletion and global warming phenomena have been the most serious threats.



The effects of pollutants on the atmosphere
Fig. (1)

First Erosion of the Ozone Layer phenomenon

Composition of ozone gas

- You may ask; why is Ozone layer formed in the stratosphere?

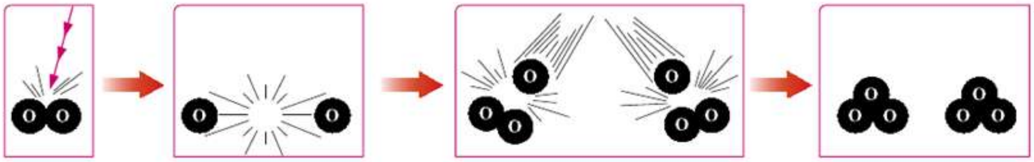
What is ozone gas? How is it formed?

Fig. (2)

Activity (1) Concluding how ozone gas forms

Observe and investigate with your classmates the following figures, then conclude how ozone gas is formed.

1. From the following, select a suitable comment for each shape and write it down under it:



....
....

Fig. (3)

- Absorption of ultraviolet radiation by gas molecules.
- Combining a free atom with a molecule of the same gas.
- Formation of Ozone molecule.
- Break down the bond in the gas molecule and formation of two free atoms.

2. What is the gas that its molecules absorb the ultraviolet rays? ....
3. What is the resultant formula of the Ozone molecule?...

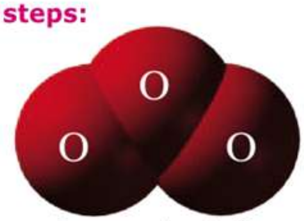
Based on the previous, ozone gas is formed in two steps:

- Breaking down the bond of the oxygen molecule O_2 when it absorbs the ultraviolet radiation (UV), producing two free active oxygen atoms 2O

$$O_2 \xrightarrow{UV} O + O$$

- Each free oxygen atom combines with an oxygen molecule to produce an ozone molecule (fig. 4)

$$O + O_2 \longrightarrow O_3$$



Ozone molecule O_3
Fig. (4)

Enrichment information and activity (1)

* Ozone gas has a faint blue color and of distinct smell. This can be observed near instruments that contain electric discharge pipes as in the cases of light photographic machines and TV sets.

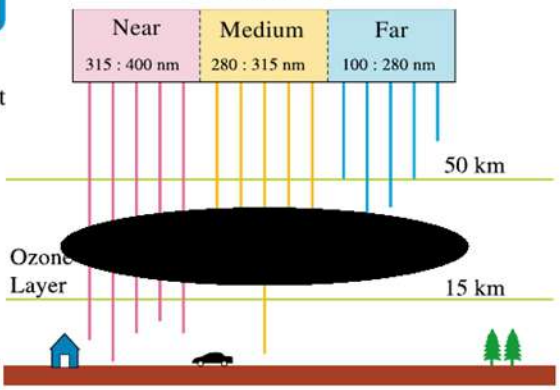
* Mention instruments produce ozone gas when they are set to work.

Ozone layer is formed in the stratosphere, and is located at a height between 20:40 km above sea level. Ozone layer is the first atmospheric layer that meets the ultraviolet radiation coming from the Sun. This layer contains a suitable amount of oxygen gas.

Importance of Ozone Layer

Investigate figure (5) and determine the type of ultraviolet radiation that does not penetrate Ozone Layer:

- with ratio 100% ....
- with ratio 95% ....



Importance of Ozone Layer
Fig. (5)

Nanometer = 1 x 10^{-9}meter

Ozone layer does not allow penetration of all far and medium ultraviolet radiations, which have very harmful effects. That is why Ozone is said to act as a protective shield for living organisms against the harmful chemical effects of the ultraviolet radiation. Table (1) illustrates these harmful effects.

Table (1)

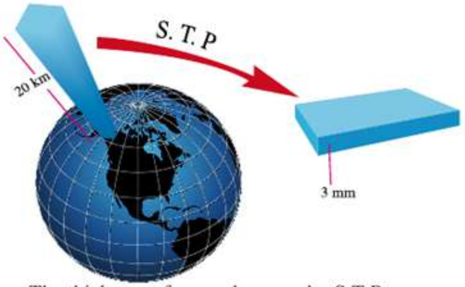
Harmful effects of far and medium ultraviolet radiations	
Human	• Increasing the rate of skin cancer. • Cataract. • Weakness of the immune system.
Amphibians	• Spoil eggs. • Decreasing rate of reproduction.
Marine organisms	• Death of plankton which is the main nutrient of small animal creatures. • Destroying the marine food chains.
Terrestrial plants	• Upset the photosynthesis process. • Shortage of crops production.

Enrichment information (2)

Ultraviolet radiations, of wavelength close to the visible light penetrates the atmosphere and reaches the earth's surface, where it helps in producing Vitamin D in the bodies of the newly born babies.

Erosion of the Ozone layer

Temperature and atmospheric pressure at Ozone layer differ from those at earth's surface. The English Scientist Dobson postulated that the thickness of the Ozone Layer is 3 mm only if it were under the normal pressure and 0º C temperature; a condition known as STP or standard temperature and pressure (fig. 6) Accordingly, he assumed that the natural amount of ozone equals 300 Dobson units.



The thickness of ozone layer under S.T.P

Fig. (6)

Exercise (1)

What is the ratio of erosion of the Ozone layer in an area if you know that the degree of its Ozone is 150 Dobson?

....

Since 1978, scientists have noticed that there was erosion of the Ozone layer above the South Pole; phenomenon known as Ozone Hole, that increases in September each year –Why? Its rate changes from year to year (fig. 7)

Enrichment information (3)

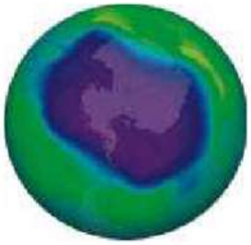
In fall, 2001 erosion of the Ozone layer reached 20×10^6 km^2, which equals twenty times the area of Egypt. In autumn, 2008 it reached 27×10^6 km^2; an area is larger than North America.

Exercise (2)

Use Dobson units at the base of figure (7) which represents the Ozone condition in fall, 2008; to show what each of the following indicates:

Green color ……………………………………..

Violet color ……………………………………..



Ozone degree (Dobson units)

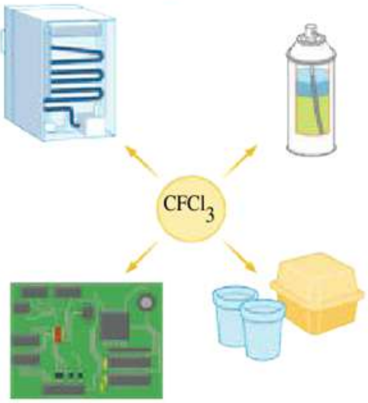
Depletion of Ozone Layer

Fig. (7)

Pollutants of Ozone Layer

The most dangerous pollutants are:

1. Chlorofluorocarbon compounds (CFCs):
   They are commercially known as Freon, which is used as a cooling material in air conditioning sets, as propellant in aerosols or as inflating material in making foam backing or as a solvent for cleaning electric circuits cards (Fig 8).
2. Methyl bromide: that is used as an insecticide to preserve stored agricultural crops.
3. Halons: that are used in fire extinguishers.
4. Nitrogen oxides: that result from the burning fuel of ultrasound airplanes (Concord).



Uses of chlorofluorocarbon compounds

Fig. (8)

Self inquiry

Have you ever asked about the effect of pollutants on Ozone layer?

Communication

Guided by your teacher, discuss with your classmates the harmful effects of pollutants on Ozone Layer.

Effect of CFCs compounds on the Ozone Layer:

CFCs compounds erode Ozone Layer in 3 steps as shown in Fig. (9)

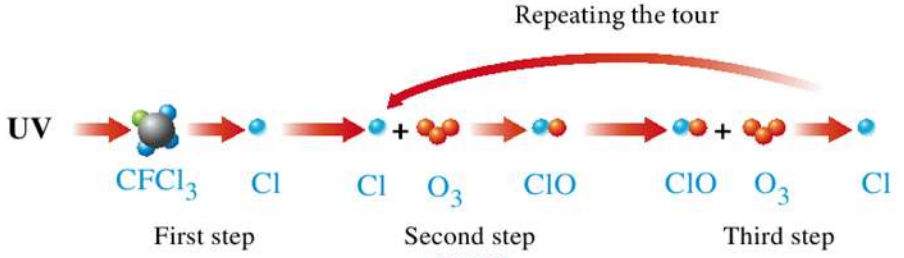


Fig. (9)

First step: Ultraviolet radiations (UV)break down the chlorofluorocarbon compounds and liberate active chlorine atoms Cl

$$CFCl_3 \xrightarrow{UV} CFCl_2 + Cl$$

Second step: Active chlorine atoms react with ozone molecules forming Chlorine monoxide ClO

$$Cl + O_3 \longrightarrow O_2 + ClO$$

Third step: Chlorine monoxide reacts with other Ozone molecule where other active Chlorine atoms liberate and play their role in destroying more amounts of ozone gas

$$ClO + O_3 \longrightarrow 2O_2 + Cl$$

(Chemical equations for illustration)

So erosion of the Ozone layer continues because of the pollutants.

The erosion of the ozone layer differs from year to year according to the amount of pollutants emitted to the atmosphere.

In September each year, the ozone decreases because all pollutants assemble as black clouds that are pushed by the wind towards South Pole, which increases the erosion of Ozone layer.

Enrichment information (4)

Each active chlorine atom destroys about 1×10^5 ozone molecules (O_3).

Protecting the Ozone Layer

Due to the serious situation of Ozone Layer, an international conference was held in Canada to discuss how to protect the ozone layer and take all suitable measures to solve this problem. They reached a group of recommendations called "Montreal Protocol" where it is signed by 191 nations. Among these recommendations:

- Use of chlorofluorocarbon compounds must be reduced and find safer alternatives.
- Stop producing the ultrasound concord planes as their exhausts affect the Ozone.

Enrichment information (5)

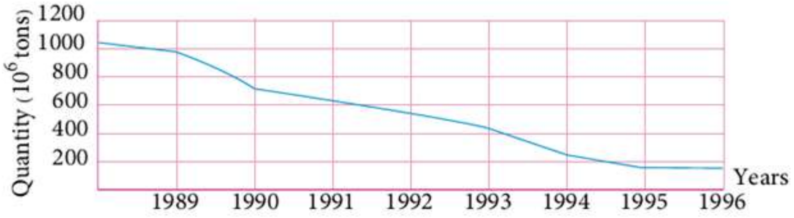
"The battle to reform the ozone layer is a good example of world cooperation ...."

UN General Secretary (16-9-2007)

Exercise (3)

Why does the world celebrate the Ozone day in September 16th each year?

....



World production of CFCs compounds

Fig. (10)

Montreal Protocol has been modified in 1990 in a way that all nations must be producting or handling CFCs compounds, otherwise they won't be allowed to export their goods. The production of these compounds has been actually reduced since that date (Fig. 10).

Enrichment information (6)

Arab Organization for Industrialization is responsible for converting all the Egyptian products that depend on CFCs into Ozone-safe products.

Look at for the Egyptian role in world environment represented by the efforts of Dr. Moustafa Kamal Tolba and write a report about his work and achievements.

Exercise (4)

What is meant by the statement "NON-CFCs" which is written on household insecticide cans ?

....

Second Global Warming

Every day on the news, you may listen or watch sea level rise, repeated tropical hurricanes, flash floods, hot waves, drought and forest fires .... What happened to the earth's climate? Why?

Hurricane cathrina

Fig. (11)

Fig. (12)

- Researches of the IPCC (The Intergovernmental Panel on Climate Change), that follow UN, showed that there is an increase in the average temperature of the Earth's near-surface air; a phenomenon known as Global warming which is caused by the greenhouse effect. What can you conclude from figures (13) & (14) ?

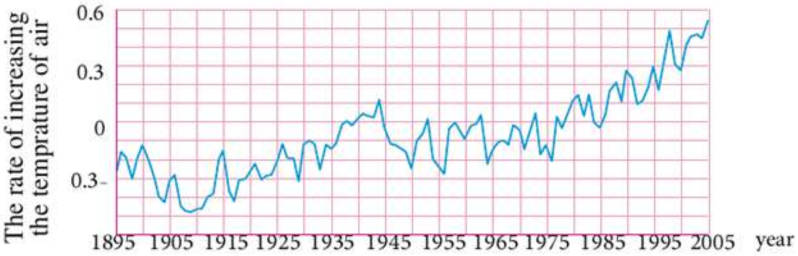


Figure (13) : Rising of planet Earth temperature

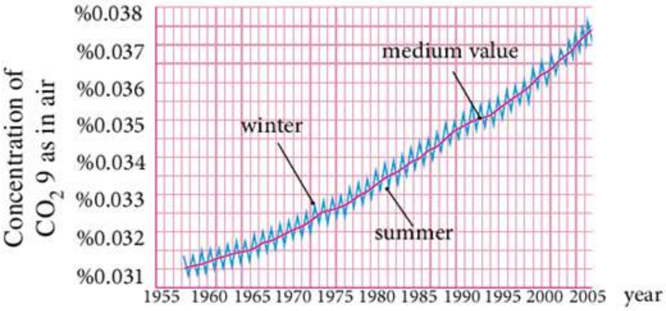


Figure (14): High concentration of CO_2 in the atmosphere

Greenhouse effect

Share your group in performing the following activity to know the greenhouse effect phenomenon.

Activity (2) Greenhouse effect

Tools :

- 2 empty soda bottles
- 2 thermometers
- Sodium bicarbonate powder
- Vinegar
- Water.

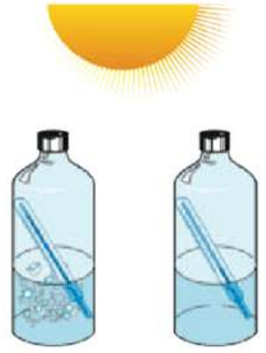


Fig. (15)

Procedures:

1. Pour some water in the first bottle and a same amount of vinegar in the second.
2. Insert a thermometer in each bottle.
3. Put some sodium bicarbonate powder in one bottle and close it immediately to keep CO_2 gas trapped.
4. Put both bottles in a sunny place fig (15).

Observation :

Which bottle shows higher increase in temperature after 10 minutes?

....

Conclusion :

Increase of the concentration of CO_2 gas contributed to higher temperature.

- The same is happening as the temperature of planet Earth has been increasing since 1935 due to the greenhouse gases in the atmosphere. These gases are produced by fossil fuel burning fig. (16) , cutting trees and forest fire.

Products of burning fossil fuel

Fig. (16)

The most important greenhouse gases

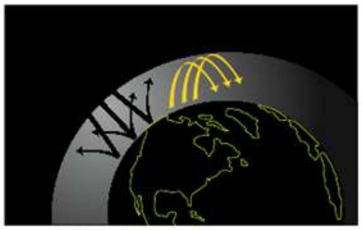
- Carbon dioxide gas CO_2. Its ratio increased in the atmosphere to 0.038% in 2005 (Fig. 14) after it was 0.031%.
- Chlorofluorocarbons CFCs compounds
- Methane gas CH_4
- Nitrous oxide N_2O
- Water vapour H_2O

Enrichment information (7)

Greenhouse gases are considered a blessing which. can be changed into a catastrophe without those gases the temperature would have decreased to - 18°C. The increase of its Concentration in the atmosphere will lead to environmental disasters.

Interpretation of the greenhouse phenomenon :

When the concentration of greenhouse gases increases in the atmosphere, it plays the role of glass in the greenhouse (Fig. 17) as it permits the visible light and short-waved radiation from the Sun to pass and be absorbed by Earth and its components which reemit the radiation back in the form of infrared radiation. Infrared radiation cannot penetrate the atmosphere as it has a long wave-length. So it is kept trapped in the troposphere causing the rise of planet Earth temperature, a phenomenon known as greenhouse effect (fig.18).



Greenhouse phenomenon
Fig. (18)

Greenhouse
Fig. (17)

The negative effects of Global Warming Phenomenon

One of the most dangerous effects is graded to the phenomenon of raising the temperature of the Earth planet.

1 Melting of the ice and snow of both South and North Poles:

Melting of polar ice would increase sea level in seas and oceans, which represents a threat of the disappearance of the coastal areas and that would lead to the extinction of some polar animals like the polar bear (Fig. 20) and seals (fig. 21).

Melting of snow masses
Fig. (19)

Polar bear
Fig. (20)

Seals
Fig. (21)

2 Severe climatic changes

Among these features is the repeated occurrence of tropical hurricanes (Fig. 22) such as hurricane Katrina in 2005, destroying floods (Fig. 23), drought waves (Fig. 24) and forest fires.

Tropical hurricane

Fig. (22)

Flood

Fig. (23)

Drought wave

Fig. (24)

- These bad destructive effects made representatives of 160 nations in Kyoto, Japan in 1997 to sign a protocol called Kyoto Protocol that suggested reducing the ratio of bad emission by cutting down the consumption of fossil fuel and searching for environmental friendly alternative energy resources.

Real life application | Energy-saving electric bulbs

In a report issued by the Egyptian electric power company, what do you choose to light a room 10 hours daily for 20 months by the same light power?

- Energy-saving bulb that cost 1.35 pounds/month
- 6 normal bulbs that cost 3.45 pound/month

"Save your money and protect your land"

Energy-saving electric bulb

Fig. (25)

A case for discussion — Managing energy consumption

Under the slogan "An hour for your Earth" all world countries make a coalition in the Earth's Day (March, 28th every year) by turning off the light of most famous touristic and cultural sites such as Evil Tower in France and the sound and light project in Abu Simple Temple in Aswan (Fig. 26).

Abu simple temple at night

Fig. (26)

Guided by your teacher, discuss with your class this issue. Make the following questions a part of your discussion subject.

- What is the relation between consuming and managing energy and protecting planet Earth?
- What is the objective of managing energy consumption?
- Do you care to turn off the light that you do not need in your house?
- Why do we all must take part in the idea "an hour for your Earth"?
- What are the ideas that you may suggest to manage energy consumption in your house, school, and city?

Lesson summary

Threats to the earth's atmosphere

- Stratosphere
  - Ozone Layer
    - Composition
    - Its importance
    - Its pollutants
    - Its protection
- Troposphere
  - Global Warming
    - Greenhouse Effect
      - Negative effects

- Ozone molecule O_3 is formed by combining one free oxygen atom with one oxygen molecule.
- Ultraviolet radiation, far and medium types have harmful effects on the life of living organisms.
- Chlorofluorocarbon compounds are the most dangerous Ozone Layer pollutants.
- Increasing CO_2 concentration in the atmosphere produces the global warming phenomenon.

Review of lesson (2)

1 Replace each of the following statements by suitable scientific term:

a) A molecule is formed from combining an atom of an element to a molecule of the same element. (……………………)

b) Continuous increase of the average temperature of the air near the surface of the Earth. (……………………)

2 Choose the correct answer from those between brackets:

a) Ozone Layer is measured by a unit called ……………. (Km / Dobson / nm / mm^3)

b) All are greenhouse gases except ……………….. (CO_2 / O_2 / N_2O / CH_4)

3 Give reasons for :

a) Formation of Ozone Layer in the stratosphere.

……………………………………………………………………………………………

b) Stop building concord airplanes.

……………………………………………………………………………………………

4 Write short note about the negative results of global warming.

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

5 The opposite figure shows a person in a car with closed windows:

a) Replace the letters A & B then label that expresses the electromagnetic waves.

……………………………………………………

b) What is the process expressed by this figure?

……………………………………………………

6 Creative thinking:

What would happen if there is no more fossil fuel?

……………………………………………………

……………………………………………………

……………………………………………………

Activity

Write a subject, supported by suitable figures and graphs, about the different ways to save energy at your house.

Unit Review

1 Replace each of the following statements by a suitable scientific term:

1) The boundary separating between stratosphere and mesosphere where temperature is rather constant. (............)
2) Charged layer reflects radio waves. (............)
3) One of the atmosphere components that its ratio increased in recent years to reach about 0.038%. (............)
4) A type of ultraviolet radiation that is absorbed completely (100%) in the Ozone Layer. (............)

2 Complete the following phrases:

1) The highest temperature layer in the atmosphere is .... and the least temperature one is ....
2) Most of weather features occur in .... layer whereas satellites swim through the .... layer.
3) Ultraviolet radiation has a .... effect, and the infrared radiation has a .... effect.
4) Among the pollutants of the Ozone Layer are .... compounds that are used in air conditioning sets and .... compounds that are used in fire extinguishers.

3 Illustrate with formulas only the role of ultraviolet radiation in the formation of Ozone gas.

....

....

4 An aeroplane captain announced that the atmospheric pressure outside the aeroplane is 90 millibar. In which layer of the atmosphere was the plane flying? Why?

....

....

5 Compare between mesosphere and thermosphere in terms of temperature, importance, and air pressure.

....

....

....

6 Based on the opposite two figures:

1) What happened to the snow masses of Greenland in the North Pole during the period from 1982 – 1992? What is the phenomenon responsible for that?

……………………………………………………………

……………………………………………………………

year 1992

year 1982

2) What are the other consequences or results of this phenomenon?

……………………………………………………………………………………………

7 Calculate the height of a mountain if the temperature at its foot is 30º C and at its top is -6 º C

……………………………………………………………………………………………

8 What are the similarity between greenhouse effect and global warming?

……………………………………………………………………………………………

……………………………………………………………………………………………

Self-assessment

Dear student: After finish studying unit 2: Atmosphere and protecting planet Earth, write down your opinion by answering the following questions:

1 What are the subjects in this unit that you found that they are useful?

……………………………………………………………………………………………

2 What are the misunderstanding of the scientific concepts and features that have been corrected during the study of this unit?

……………………………………………………………………………………………

3 What are the difficulties you faced during studying and carrying out the activities of this unit?

……………………………………………………………………………………………

4 What are the subjects you studied and see that they must be reconsidered in terms of their content to match your level of understanding?

……………………………………………………………………………………………

5 What are the subjects that you suggest studying them and they are not included in the content of the unit?

……………………………………………………………………………………………

Unit 3

Fossils and Protecting Species from Extinction

Lessons of the unit

Lesson 1 : Fossils

Lesson 2 : Extinction

Sources of knowledge and learning

• Scientific books and encyclopedias

1 The Rocks - Nataly	Family library
2 Disasters - Nedhalay	Dar El Farouk
3 Guinnes Q & A (The world of dinosaurs)	Family library
4 Forests	Lebanon library publishers

Unit objectives

By the end of this unit, the student should be able to :

1. Recognize the concept of fossil.
2. Give different examples of fossils.
3. Infer the types of fossils.
4. Explain the ways of fossils formation.
5. Design a cast of a candle.
6. Design models of cast and mold.
7. Compare between types of fossils.
8. Mention the importance of studying fossils.
9. Calculate the age range of some fossils.
10. Appreciate the importance of the discovery of fossils in the service of man, environment and society.
11. Establish a vision to take responsibility and take personal decisions to protect fossils.
12. Collect data and information and expressed his opinion in the protection of fossils and their scientific and social importance.
13. Use research skills and inquiry in the study of fossils.
14. Define the concept of extinction.
15. Use fossils to indicate extinction of some types of organisms.
16. Conclude the factors that cause extinction of same types of living organisms.
17. Give examples of extinct and endangered species.
18. Understand the effect of extinction on ecological equilibrium.
19. Suggest new solutions to protect living organisms from extinction.
20. Deal gently with the organisms and in a civilized manner with the environment.
21. Act consciously with the environment and appreciate the importance of normal life.
22. Appreciate the role of scientists in protecting living organisms from extinction.
23. Use life skills in the study of extinction and protection of living organisms from extinction.
24. Write a scientific report on the causes of extinction of some organisms.
25. Continue and express their views and discuss with his colleagues and the teacher about ways to protect living organisms from extinction.
26. Appreciate the greatness of God in the creation of living organisms.

Lesson 1

Fossils

Lesson objectives:

By the end of this lesson, the student should be able to:

1. Define the concept of fossils.
2. Give different examples of fossils.
3. Show the types of fossils.
4. Determine the ways of fossils formation.
5. Design a cast of a candle.
6. Design models of cast and mold.
7. Compare between mold and trace.
8. Give examples of complete body fossils.
9. Conclude the concept of petrif ication and petrified fossils.
10. Explain how the petrified woods are formed.
11. Mention the importance of studying fossils.
12. Calculate the age range of some fossils.
13. Appreciate the importance of the discovery of fossils.
14. Take personal decisions to protect fossils.

Points of the lesson:

1. Concept of fossil.
2. Types of fossils and their formation.
3. Importance of fossils.

Included issues :

The scientific, technological and social importance of fossils.

Fossils … an exciting world … a story told by rocks .. tells us about the deep past , million years ago even before the creation of man on Earth.

Fossil concept :

Activity (1) Determining the concept of fossil

Organize a trip with your classmates to visit the Geological Museum at the River Nile bank in Zahraa El Maady and observe the fossils presnet in it :

Traces of worms' tunnels
Figure (2)

Dinosaur foot prin
Figure (1)

Remains of dinosaur's skull
Figure (4)

Remains of shark's teeth
Figure (3)

Observations :

What is the name you expect to reflect the residues or traces that indicate ?

The activity of the living organism during its life?

....

Remains of a living organism after death ? ……
……………………..........…………….....................

Conclusion :

Traces and remains of the old living organisms that are preserved in sedimentary rocks are known as fossils.

Types of fossils and ways of formation

Fossils differ according to the ways of formation.

First type : Fossil of a complete body

Complete body fossil was formed when the organism died and was buried fast in a medium that preserved it from decomposition as in the case of snow or amber. It keeps the whole shape and all the details of the body.

Enrichment information (1)

In Latin, the word fossil means something buried in Earth. The science that studies fossils is Paleontology.

Examples of a complete body fossil:

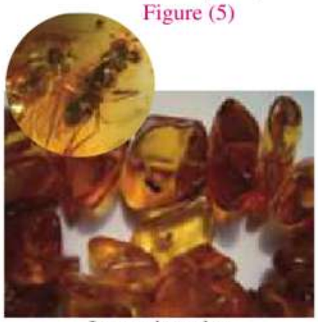
Mammoth (It is a type of extinct elephants)
Figure (5)

1. Mammoth fossil :

A snow avalanche occurred in Siberia 25000 years ago. It caused the death of mammoth animal, which were also buried immediately in the snow.
When the first mammoth fossil was discovered in the last century, it was complete as the whole shape, and all hair, flesh and food in its bowels are all still completely preserved.

2. Amber fossil :

During some old geologic periods, there were common pine trees. These trees secreted resinous matter. This matter covered insects, After the resinous mater had been solidified it was changed into amber and preserved the bodies of these organisms from decaying (Fig. 6).



Insects in amber
Figure (6)

Second type : mold

Participate with your group in doing the following activity. Each student makes a different model.

Activity (2) Making model of a mold

Materials and tools :

- Plaster of paris.
- Plastic container.
- Water.
- Metal mold.
- Food oil.
- Rod for stirring.
- Brush.

Procedures :

1. Use the brush to paint the internal surface of the mold with oil.
2. Mix plaster of paris with water and continue stirring to a suitable mixture.
3. Pour the mixture in the mold and wait until the plaster of paris solidifies (Fig. 7).
4. Separate the hard mixture from the mold (Fig. 8).

Figure (7)

Observation :

What do the details on the internal surface of hard plaster show?
....

Figure (8)

Conclusion :

The hardened plaster of paris forms a solid mold of the metal mold.

Formation of a solid mold

1. When a snail (or clam) dies, it falls on the sea floor and is buried in sediments.
2. The sediments fill up the shell cavities and is solidified as the time passes.
3. The shell could decompose completely, leaving a rock mold carrying the internal details of the snail. (Fig. 9)

Ammonites fossil mold
Figure (9)

Real-life application | Candle mold

- Melt paraffin wax or wax remains in a water bath.
- Roll a piece of strong paper into a cylinder. Put it in an empty yoghurt can and then pass a thick thread through the cylinder.
- Pour the melted wax in the cylinder, keeping the thread in the middle all time.
- Remove the paper from around the wax after it solidifies. Put the candle in a suitable glass saucer (Fig. 10).

Candle mold
Figure (10)

Third type : cast

Activity (3) Make a model of a cast

Participate with your group in doing the following activity, each student makes a different model.

Materials and tools :

- Coloured clay.
- A shell of a clam.

Procedures :

1. Press on the clay by your hand to make a plane surface.
2. Put the shell on the surface of the clay and press it gently.
3. Remove the shell from the clay.

Shell cast
Figure (11)

Observation :

What do the details on the clay indicate? ……………........………………….............................

Conclusion :

A replica of the original outer shell shape is formed and it is known as cast.

- What a dead body of an organism leaves on sedimentary rocks is called cast (Fig.12)?
- What a living organism body leaves during its life is known as trace. (Fig.13)?

Dinosaur foot print
Figure (13)

Fish cast
Figure (12)

Exercise (1)

Choose the correct term (mold – cast – trace) for each of the following fossils:

Fossil .... of ferns
Figure (14)

Fossil ... of worms' tunnels
Figure (15)

Fossil .... of trilobite
Figure (16)

Fourth type : Petrified fossils

A type of fossils where the minerals can replace the organic matter of organism part by part without changing the shape, for examples:

Dinosaur's tooth
Figure (17)

Dinosaur's eggs
Figure (18)

Petrified wood
Figure (19)

Activity (4) Describing petrified wood

Visit with your classmates the petrified wood protectorate in Qattamiya and observe the petrified stems and trunks of trees that are more than 35 million years in age (Fig. 19).

Observation :

Are these trees rocks or fossils? ………………………….....................…………………..

Conclusion :

1. Petrified woods look like rocks but they are fossils because they give us details about once living old plant.
2. Petrified wood was formed by replacing , part by part, of the original wood material by silica, and this is known as "petrification"

Enrichment information and activity (2)

*An Egyptian dinosaur has been discovered in Bahariya Oasis, 6th October Governorate, and parts of it are being displayed in the Egyptian Geological Museum.

*Search for the Egyptian Geological Museum in the internet and write a report about it.

Importance of fossils:

Fossils are important because they help in:

1. Age determination of sedimentary rocks

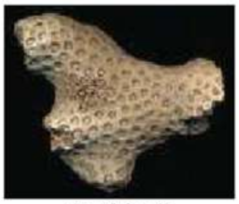
Fossils of the organisms that lived a short period of time in the past and became extinct are known as index fossils. They indicate the age of sedimentary rocks, becaus the age of rocks is the same age of fossils extisted in them.

2 Figuring out the paleoenvironment:

Fossils give an idea about the environment in which they lived during the old geological ages. Therefore, they could also indicate the climate of these ages as shown in the following examples:

Nummulites fassil
Figure (20)

Ferns fossil
Figure (21)



Coral fossil
Figure (22)

- Nummulites fossils:

Figure (20):

They are found in the limestone rocks Mokattam's mountain and indicate that there was a sea floor in this area more than 35 million years ago.

- Ferns fossils:

Figure (21):

They indicate that the environment where they lived was a hot and rainy tropical environment.

- Coral fossils:

Figure (22):

They indicate that the environment where they lived was clear, warm and shallow seas.

Exercise (2)

How can you infer from the presence of coral fossils in an area to know its past climate?

....

3 Studying life evolution :

Studying the fossil record showed that the life started first in sea, then established on land and organisms evolved always from simple to complicated higher forms. Algae preceded mosses and ferns. Angiosperms appeared before gymnosperms. Invertebrates such as corals and mollusks with shells appeared before vertebrates. The first vertebrate to appear was the fish, followed by amphibians and reptiles and finally. Birds and mammals appeared together after the reptiles.

Archaeopteryx fossil links between reptiles and birds
Figure (23)

Exercise (3)

Arrange the following fossils according to their appearance on the life stage:
(Mold fossil of fish – Mammoth fossil – Trilobite fossil – Archaeopteryx)

………..

4 Petroleum exploration:

When searching for petroleum, geologists take samples from the rocks of the exploratory wells. These sample are studied microscopically. If they contain microfossils like foraminifera (Fig. 24) and radiolaria (Fig. 25), this could be a good indication of the age of the rocks from which they were taken. and the suitable conditions for petroleum formation.

Foraminifera
Figure (24)

Radiolaria
Figure (25)

A case for discussion | **The geological heritage**

Abu Roash Area in 6th October Governorate is considered an educational field for geology students as it is rich in layers and fossils from the cretaceous age which are rare in North Egypt. However, heavy construction projects are carried out there. Guided by your teacher, discuss with your classmates this issue taking into account the following questions:

- Do you prefer to convert this area into a natural protectorate or you agree to remove rock layers to build houses for the villagers?
- Is there any relation between the civilization of nations and conservation of their geological heritage?
- What would you do if you came across a valuable fossil?
- What do you suggest to preserve the geological heritage?

Lesson summary

Fossils

- Types and ways of formation
  - (1) Fossil of a complete body
  - (2) Cast
  - (3) Mold
  - (4) Petrified fossils
- Importance
  - 1) Age determination of sedimentary rocks
  - 2) Figuring out paleoenvironment
  - 3) Studing life evolution
  - 4) Petroleum exploration

- Fossils: Are remains or traces of organisms that lived in the past and were preserved in sedimentary rocks.
- Index fossils indicate the age of the sedimentary rocks in which they are found.
- Fish is first vertebrate to appear, followed by amphibians, then reptiles and finally birds and mammals appeared together.

Review of lesson 1

1 Write the scientific term for each of the following statements:

(1) Remains of old organisms that lived in the past for a certain period and then became extinct.

(……………)

(2) Replacing, part by part, the wood material of trees by silica to form petrified woods.

(……………)

2 Complete the following phrases:

(1) Archaeopteryx represents the link between …………….. and …………......................

(2) Fossils are used in …………… exploration and determining the age of ………….........

3 Choose the correct answer from between brackets:

(1) …………….. is an example of microfossils.
(Mammoth / Ferns / Foraminifera / archaeopteryx)

(2) Complete fossils of insects are found preserved in ………..
(ammonites / amber / igneous rocks / ambergris)

4 Mention the importance of each of the following:

(1) Coral fossil ………………………………………………………..............................……..

(2) Nummulites fossil ………………………..................………….…...…………………….......

5 What is the difference between ?

(1) Trace and Mold.
…………………………………………………………….....………………………..................

(2) Cast and Mold.
……………………………………………………………..……………….......................…

6 Give reasons for:

(1) Naming the petrified forests with wood mountain.
……………………...………………………………………………………………..............…

(2) El-Mokattam's mountain was once a sea floor more than 35 million years ago.

………………………………………………………………………………………………

❼ Mention the name and type of each fossil illustrated in the following figures:

(1) ……………

(2) ……………

(3) ……………

(4) ……………

(5) ……………

(6) ……………

❽ Mention the suitable conditions for fossil preservation (as you studied in this lesson)

………………………………………………………………………………………………

………………………………………………………………………………………………

❾ Creative thinking:

Your shoe was casted on a wooden mold resembling the shape of the foot.
Mention as many types of molds as you can that are being used in different purposes around you.……………………………………………………………………
…

Activity

Consult your teacher about the suggestion of making a trip to Gebel El-Mokattam to collect samples of limestone rocks that contain fossils of nummulites to decorate your class or keep them in the museum of the science society of your school.

Lesson 2

Extinction

Lesson objectives:

By the end of this lesson, the student should be able to:

1. Define the concept of extinction.
2. Using fossils to indicate extinction of some types of organisms.
3. Imagine the concept of extinction by reading the fossil record.
4. Conclude the factors that cause extinction of some types of living organisms.
5. Take responsibility in reducing rates of environmental pollution.
6. Understand the effect of climatic changes and natural disasters on ecological equilibrium.
7. Give examples of extinct and endangered species.
8. Understand the effect of extinction on ecological equilibrium.
9. Protect the endangered living organisms.
10. Treat the environment with consciousness and appreciate the importance of natural life.
11. Respect the value and role of living organisms in the ecological equilibrium.
12. Suggest new solutions to protect living organisms from extinction.
13. Deal gently with the living organisms.
14. Appreciate the role of scientists in protecting living organisms from extinction.

Points of the lesson:

1. Concept of extinction.
2. Using fossils to indicate extinction.
3. Factors causing extinction of species.
4. Effect of extinction on environmental equilibrium.
5. Ways to protect living organisms from extinction.

Included cases:

1. Extinction.
2. Environmental pollution.
3. Prevention of cruelty to animals.
4. Ecological equilibrium.

Concept of extinction :

Arwa ram
Figure (1)

Activity (1) Determination of the concept of extinction:

Participate with your classmates in a trip to the Zoo in Giza or Alexandria or watch a movie about it. Search for the wild ram known as arwa ram (Fig. 1).

Observation :

1. Do you know that it disappeared form wildlife and the rest of it is what you see only?
....
2. What do you expect to happen if we could not preserve the few number that are still living? ....

Conclusion :

The continuous decrease without compensation in the number of a certain species of living organisms until all members die out is known as Extinction.

Exercise (1)

Conclude a definition to the concept of the moment of extinction
....

Using fossils to indicate extinction :

Activity (2) Knowing fossils of some extinct species:

Participate with your classmates to make a trip to the Geological Museum on the River Nile bank in Zahraa El Maadi, Cairo and observe the displayed fossils.

Fish's fossil
Figure (2)

Dinosaur's fossil
Figure (3)

Archaeopteryx fossil
Figure (4)

UNIT THREE

Observation :

1 Are the fossils of fish, reptiles and birds similar to their living counter parts now?

……………………………………………………………………………………………………

2 Are there still dinosaurs in Egypt like those you watched as fossils?

……………………………………………………………………………………………………

Conclusion :

The fossils in rocks of different areas which are known as the fossil record indicate the extinction of species of once living organisms. Most of them have appeared and become extinct before the creation of man.

Reading in the fossil record

- Since the terrestrial life has appeared 570 million years ago, it witnessed ages when species flourished, and then they suffered from rapid decrease in number of its members until they became extinct.
- The known ratio of living organisms now does not exceed 2% of the total species that have appeared since the establishment of planet Earth.

Information and enrichment activity (1)

* Most dinosaurs became extinct by the end of the Mesozoic Era (66 million years ago) due to environmental and climatic changes.
* Look through scientific magazines and references and check the internet sites for the types of dinosaurs, if they laid eggs or gave birth? How did they become extinct? In addition, write a report supported by pictures about them.

Dinosaur
Figure (5)

Factors causing extinction of species:

Scientists postulated many theories to interpret the great extinction phenomenon (mass extinction); theories such as meteorite impacts with Earth, the onset of a long glacial age, or due to the poisonous gases emitted by active volcanoes. Recent extinction that is occurring now caused by different factors. Most of them are due to the interference of man with nature such as:

1 Destroying natural habitat

Tropical forests include about (one third) of the terrestrial living organisms. Each tree forms a shelter of more than 300 species of living organisms.
Removing forests (Fig. 6) destroys the habitat of these species and drive them stray and homeless.
Scientists estimate that we lose about 68 species of trees every day.

Cutting forest trees
Figure (6)

Enrichment information (2)

Half of the world trees has become extinct since 1950 and scientists expect losing a tree out of five in 2020. In Egypt some agricultural environments have converted into populated areas as in the cases of Giza, Zaytoun, El-Marg, and Shoubra.

Leather products made of snake skin
Figure (7)

2 Overhunting :

Hundreds of reptiles and mammals species become recently extinct due to the absence of laws that control wild animal hunting at the beginning of the 20^{th} century. The progressive development in the technology of hunting weapons, and the increased rate of interest in animal skins and furs (Fig. 7)

3 Environmental pollution:

Since the industrial revolution in 1750, pollution has propagated in all ecosystems. Among the ways of pollution that contributed to the extinction of living organisms are:

- Acidic rain fall and destroy forest trees.
- Chemical insecticides that break down the food chains.
- Oil leaks in seas and oceans (Fig. 8).

Death of marine bird due to oil pollution
Figure (8)

4 Climatic changes and natural disasters :

Active volcano
Figure (9)

Drought
Figure (10)

High marine tide (Tsunami)
Figure (11)

Exercise (2)

Mention five natural disasters that threaten living organisms.

....

Self-inquiry

Have you ever asked about the environmental problems and the disruption of ecological equilibrium?

Communication

Guided by your teacher, discuss with your classmates how to solve the environmental problems and the disruption of ecological equilibrium.

The extinct and endangered species :

First: Extinct species

The life, since its establishment, witnessed five mass extinctions. In each one, most of the species become extinct, followed by appearance of another more evolved types. Some scientists believe that we live the sixth extinction age (Recent extinction) where the rate of extinction is 40 times larger than the normal rate of extinction.

Exercise (3)

One of the reports says that the number of living organisms now is 10 million species. 138 of them get extinct every day. Calculate the number of extinct species every:

1) Month ……………………..…… 2) Year ……………..........……

3) Ten years …………………….. 4) Hundred years …....…………..

"In case the rate of extinction is constant"

Examples of some extinct species:

- Hundreds of millions of organisms of the old times became extinct. Dinosaurs (Fig. 12) and mammoth are the most famous types.

Dinosaur
Figure (12)

The most common recent types are:

1 Dodo bird :

It's a non-flying bird due to the reduced size of its wings. It cannot run fast due to its short legs. These features make it an easy target for hunters (Fig. 13). It became extinct in 1681 in the Indian islands 50 years after Man invaded these islands.

Dodo bird
Figure (13)

Enrichment information (3)

Dodo bird is about one metre long. It fed on fruits and built its nest on the ground. Its name in Indian language means "stupid" as the people thought it does not defend itself.

2 Quagga :

It's a mammal, midway between horse and zebra (Fig. 14). The last member of its species was killed in South Africa by hunters in 1883.

Quagga
Figure (14)

3 Passenger pigeon:

Its native habitat was North America. Scientists estimated its number in 1850 by more than billion (1000 million) birds. The last member of its species died in one of the zoos in 1914 (fig. 15). Its extinction is attributed to cutting the oak and beech trees where they used to build their nests , Mass hunting of the bird and, Its female lays only one egg each spring.

Passenger pigeon
Figure (15)

4 Australian wild cat (Tasmanian cat) :

This animal has a wolf's head, dog's tail, a pouch like kangaroo, and striped skin like a tiger (Fig. 16).
The decrease of its numbers, is attributed to being hunted by peasants because it preys on sheep and chickens. The last member of its species died in Sidney Zoo, Australia in 1936.

Tasmanian cat
Figure (16)

5 Golden frog :

The golden frog (fig. 17) has disappeared since May 1989 and has not been seen since that time.

Golden Frog
Figure (17)

Second : The endangered species

IUCN, the International Union for Conservation of Nature, was established in 1963 to protect the endangered species.
It issues every year A RED LIST (Fig. 18), which is a list of endangered species and the level of danger of each species.
The endanger level is classified, based on the rates of decrease or increase in the numbers of the species and its stability in its environment, into 3 levels;
Critically Endangered (CR). Endangered (EN) and Vulnerable (VU).
There are about 5000 endangered species, and they are being followed up and their state is under investigation.

The red list Figure (18)

Examples of some endangered species:

In 2008, the Red List includes about 450 endangered species; the most popular of them are:

1 Panda bear :

Panda bear (Fig. 19) inhabits Bamboo forests in northeast China. It is one of the most endangered species due to its weak rate of reproduction and the scarcity of bamboo plant (it is only food) which does not blossom except once every 100 years.

Panda bear
Figure (19)

2 Rhinoceros:

Rhinoceros (Fig. 20) is endangered because its habitat is being transformed into cultivated land as well as it is being overhunted for, using its horn for medical purposes.

Rhinoceros
Figure (20)

3 Bald eagle:

The head of bald eagle is covered with white feathers (Fig. 21), which make it looks bald. It is endangered because it feeds on fish that contain poisonous matter that is being dumped in lakes and rivers.

Bald eagle
Figure (21)

4 Ibis bird:

Ibis birds (Fig. 22) disappeared from Aswan after the building of the High Dam due to loss of its nests.
The bird is still found in Upstream Nile in Africa.
It must be imported back to reproduce its species in the protectorates established in the Nile islands in Aswan.

Ibis bird
Figure (22)

Enrichment information (4)

Pharaohs drank the only water from which Ibis drank as it used to avoid the polluted water. This is the reason which explains why Ancient Egyptians sanctified this bird and made statues of it and inscribed its picture on their temples walls.

5 Papyrus plant:

Papyrus plant (Fig. 23) grow in swamps of the Upper Nile. The Pharaohs used it to manufacture writing papers. It disappeared due to the drying of these swamps. It is now reproduced in Pharaonic Village in Giza (Hassan Ragab Village).

Papyrus plant
Figure (23)

Real-life application | **Fashion and extinction**

Instead of hunting animals for their skin and furs to make coats and shoes, it is better to use artificial alternatives like those in the market which look exactly like the natural leather, even cheaper in price….. Start with yourself and protect animals from extinction.

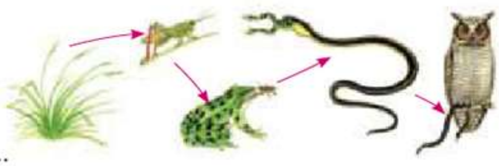
Enrichment activity (5)

Collect data, information and pictures from the magazines, scientific encyclopedias and internet about some endangered animals such as double-hump camel, snow tiger, blue whale, antelope dear and (orangutans).

Effect of extinction on the ecological equilibrium :

Activity (3) Effect of extinction on ecological equilibrium :

Record your observation on the figure (24) by answering the following questions:



Food chain
Figure (24)

1. What would happen to snakes in the absence of frogs?

....

....

2. What would happen to the frogs and grasshoppers in the absence of snakes?

....

....

Conclusion :

1. Each living organism plays a role in transferring the energy throughout the food chain.
2. When an organism disappears, its role stops, affecting the rest of members of the food chain or food web.

- Extinction of species or a group of species in a balanced ecosystem causes a cavity (cut link) in the ecosystem that would disturb the ecosystem equilibrium or destroy it. The ecosystem is classified according to the degree of effec

Desert ecosystem
Figure (25)

Tropical forest ecosystem
Figure (26)

The simple ecosystem (few members) is severely affected by the absence of one type of species of organisms because of the rarity of alternative that compensates this absence as in the case of the desert ecosystem fig.(25). On the other hand.
The complicated ecosystem (multiple members) is not affected much by the absence of a species of the living organisms because it has many alternatives as in the case of the tropical forest ecosystem (Fig. 26).

Ways to protect living organisms from extinction :

The awareness about the importance of protecting natural life increased after great harmful consequences that appeared since the mid 20th century. The best ways to protect rare and endangered living organisms are shown as follows:

Enrichment information (6)
As each species of plants gets exinct, about 30 species of animals that depend on it as a food or shelter get exinct.

1. Issuing legislations and rules to organize and control hunting on land, sea, and air especially for the rare types.
2. Increasing the awareness about the importance of natural life to sustain the existence of mankind.
3. Rearing and reproducing the endangered species and sending them back to their native habitats.
4. Establishing gene banks for those much endangered species.
5. Establishing natural protectorate areas.

- Natural protectorates are safe areas established to protect endangered species in their homeland.
  The most recognized protectorates in the world are bluestone in USA where the grey bear is protected (Fig. 27). and the panda protectorate in Northeastern China.
  The number of natural protectorates in Egypt reached about 27 protectorates in 2009.
  Ras Mohamed protectorate (Fig. 28) is the first established protectorate in Egypt. This was in 1983. It is characterized by the presence of rare coral reefs and coloured fish.

  In 2005, UNESCO declared Wadi Hetan, part of Wadi El-Raiyan Protectorate in Fayoum, as the best world heritage of whales' skeletons. It contains complete whales'skeletons fossils (Fig. 29) that are dated to be as old as 40 million years.

Grey bear
Figure (27)

Ras Mohamed protectorate (shaped as a chin)
(Figure (28)

Whale fossil
Figure (29)

Enrichment information (7)
Wadi Hetan Area contains about 406 whales' fossil, 205 of which are complete. Ras Mohamed Protectorate contains 134 types of rare coral reefs.

A case for discussion | Prevention of Gruelty to Animals

In one country, part of the bear body is used to treat some illnesses. Continuing doing that endangered the bear to become extinct.

Guided by your teacher, discuss this issue with your classmates taking into consideration the following questions:

1. Is it wrong to kill bears for treating people?
2. Do you accept using cows for the same manner?
3. Is there any relation between continuity of animal life and human life?
4. What do you think about the societies for the prevention of cruelty to Animals?

Lesson summary

- Concept of extinction
  - Extinct species
  - Endangered species
  - Effects of extinction on ecological equilibrium
    - Simple Ecosystem
    - Complicated Ecosystem
  - Ways to protect living organisms from extinction

- **Extinction:** Continuous decrease in numbers of species members without compensation until all die out.
- **Example of extinct species:** Dodo bird, quagga, passenger pigeon, tasmanian cat, and golden frog.
- **Examples of endangered species:** Panda bear, rhinoceros, bald eagle, ibis, and papyrus plant.
- **Ras Mohamed protectorate:** is considered the first natural protectorate established in Egypt.

Review on lesson 2

1 Choose the correct answer from between brackets:

(1) ……….. indicate(s) extinction.
(Fossils / Protectorates / Evolution / Ecological equilibrium)

(2) ………. protectorate is the first established natural protectorate in Egypt.
(Saint Cathrine / Ras Mohamed / Wadi Hetan / Petrified forest)

2 Write the scientific term for each of the following statements:

(1) The death of all members of species of living organisms. (…………..…)

(2) Extinct animal has a wolf's head, a dog's tail and a tiger's skin. (…………..…)

3 Mention the most important factors that cause species extinction

....

....

4 Explain the effect of extinction of a species of living organisms on:

(1) Simple ecosystem ………………………………………………………………

(2) Complicated ecosystem ……………………………………………………………

5 Mention what characterize each of the following:

(1) Ras Mohamed protectorate.

(2) Wadi Hetan area.

6 Exclude the unsuitable word and mention what the rest has in common:

(1) Dodo / Quagga / Bald eagle / Tasmanian cat.
……………………………………………………………………………………………

(2) Panda / Rhinoceros / Golden frog / Bald eagle
……………………………………………………………………………………………

7 Give reasons for:

(1) Removing trees of tropical forests is one of the most important factors of extinction.
……………………………………………………………………………………………………

(2) The desert ecosystem is significantly affected by the absence of one of its species.

……………………………………………………………………………………………

8 Look at the pictures of these land animals. Mention the name of each one and classify it as extinct or endangered. Give reasons for your assessment.

(1)

(2)

(3)

(4)

……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………

9 Creative thinking:

Somebody told you that he has seen a blue whale when he was fishing near some shores. Write as many questions as you can that you ask this person to believe his story.

……………………………………………………………………………………………
……………………………………………………………………………………………

Activity

Write a research about the names and locations of the natural protectorates in Egypt, using school library or the internet. Illustrate the date of establishment, the location, and the characteristics of Saloga and Ghazal protectorate in Aswan and its touristic importance.

Unit Review

1 Choose the correct answer from between brackets:

(1) Fossils are often found in .... rocks. (metamorphic / sedimentary / volcanic / igneous)

(2) All of the following are endangered species except ....

(panda / bald eagle / quagga / rhinoceros)

(3) All of the following are natural disasters that threaten the living organisms except ....

(floods / volcanoes / drought waves / global warming)

2 Define each of the following:

(1) Fossil: ....

(2) Index fossil: ....

(3) Natural protectorates: ....

3 Correct the following statement without changing the underlined phrases:

(1) The first discovered fossil of <u>mammoth</u> were found preserved in amber.

....

(2) <u>Ferns fossils</u> indicate that they lived in mild environment.

....

(3) <u>Destroying the habitat</u> is one of the factors that contribute to species adaptation.

....

(4) The <u>red list</u> issued by IUCN includes the extinct species.

....

4 Mention three ways to protect living organisms from extinction:

....

5 Give reasons for:

(1) Petrified woods are considered from fossils although they look like rocks.

....

(2) Fossils are important in petroleum exploration.

....

(3) The simple ecosystem is significantly affected by the absence of one of its species.

....

6 Which does represent mold or cast in each of the following:

(1) The mask of superman : ....

(2) Wax Museum statues in Helwan : ....

(3) Cubes of ice: ....

(4) Models of clothes shows : ....

Cogitation and Self-assessment

Dear student: After you finish studying unit 3 : Fossils and protecting of species from extinction, write down your opinion by answering the following questions:

1 What are the subjects that you benefitted from by studying this unit?

....

2 What are the misconceptions that you had about the scientific concepts and features and corrected them during the study of this unit?

....

3 What difficulties did you face during studying and carrying out the activities of this unit?

....

4 What subjects did you study and feel they have to be reconsidered in terms of their contents to match your level of understanding?

....

5 What subjects do you suggest to study but they were not included in this unit?

....

General exercises (1)

1 Choose the correct answer between brackets :

1. .... form positively charged ions when they enter in the chemical reactions.
   (Inert gases - Nonmetal - Halogens - Alkaline Earth metals)
2. The elements of group (7A) are called ....
   (alkali metals - halogens - inert gases - alkaline Earth metals)
3. Meteors are formed in .... (exosphere - thermosphere - mesosphere - stratosphere)
4. .... is one of the most important causes of the recent extinction age.
   (Volcanic eruption - Falling of icebergs - Falling of meteorites - Overhunting and environmental pollution)

2 Write the chemical equations representing the following :

1. Dissolving of magnessium oxide in water.
2. The reaction between chlorine gas and potassium bromide.
3. The electrolysis of water.

3 Mention one difference between each of :

1. Flourine molecule and helium molecule.
2. Natural and industrial water pollutants.
3. Troposphere and stratosphere.
4. Simple and complicated ecosystems.

4 Give reasons :

1. Water molecule is from the polar molecules.
2. Sodium is kept in kerosene.

3. The lower part of stratosphere is suitable for plane flying.

....

4. The bald eagle is one of the endangered species.

....

5. Write brief notes on :

1. The relation between water density and its temperature.

....

2. The relation between rising above sea level and atmospheric pressure.

....

3. Global warming phenomenon.

....

6. To who are these works/achievements attributed ?

1. The discovery that the nucleus of the atom contains positively charged protons.

....

2. The discovery of the existence of two magnetic belts around planet Earth.

....

3. Issuing a red list for the endangered species.

....

General exercises (2)

◆: Complete the following statements:

1. In Mendeleev's table the elements are arranged ………….. according to their atomic weight.
2. The Newzealand scientist Rutherford discovered that the atom contains ………… of positive charge.
3. The alkali metal elements are ………….. valent.
4. Halogens lie in the elements of ………….. group.

❖: Choose the correct answer for each of the following:

1. The number of known elements is.......

   a- 216 b-118 c-316 d-16

2. The number of negative electrons in the atom in its normal state equals

   a- number of protons.
   b- number of neutrons.
   c- twice the number of protons.
   d- half the number of neutrons.

3. The atomic number of the elements equals:

   a- Neutron numbers inside the nucleus.
   b- Number of electrons which rotate in the energy levels around its atom's nucleus.
   c- The number of protons inside the nucleus.
   d- b&c are correct.

4. The density of pure water in solid state is:

   a- Less than its density in liquid state.
   b- Equal to its density in vapour state.
   c- Greater than its density in liquid state.
   d- Greater than its density in vapour state.

5. From the most common recently extinct species is........

   a- Dodo bird.
   b- Quagga.
   c- Golden frog.
   d- All the previous.

◆: Mark sign (√) in front of the correct answer and sign (x) in front of the wrong ones in the following.

1. The alkaline earth metals are good conductors of heat and electricity.

2 Halogens are univalent metals.

3 The compounds of nitrogen oxides are from the pollutants which affects the ozone layer.

4 There are fossils of complete insects kept in amber.

5 The elements are arranged descendingly according to their atomic weight in the modern periodic table.

X Write the scientific term for the following statement.

1- An atmosphere layer at which the air moves vertically.

2- The traces and remains of living organisms which are kept in sedimentary rocks.

3- Elements that have both properties of metals and non-metals.

4- An atom lost or gained one electron.

5- A bond that exists between water molecules.

General exercises (3)

A) Choose the correct answer from the following:

1. In the periodic table, the elements which are identical in properties lie in the same:

   a- Period b- Group c- Nucleus d- Energy level.

2. The scientist who left vacancies in his table to be filled with suitable discovered elements in future is:

   a- Mosely b- Newlander c- Bohr d- Mendeleev.

3. The block which contains the groups 1A, 2A in the periodic table is:

   a- s b- p c- d d- f

4. The elements which occupy the middle block (d) in the periodic table is ...... elements.

   a- alkali b- alkaline earth c- transition d- inert

5. The scientist who discovered the main energy levels is:

   a- Mendeleev b- Bohr c- Moseley d- Rutherford

6. Which of the following belongs to the same group in the periodic table?

   a- Na, C b- Na, Li c- Na, Cu d- Na, Ne

7. The scientist who discovered that the nucleus of the atom contains positively charged particles is:

   a- Mendeleev b- Moseley c- Rutherford d- Bohr

8. The element which its atomic number (18) is :

   a- Transitional element b- Inert gas

   c- Metallic element d- Halogen element

9. The element which its atomic number is (17) is similar in its chemical construction to the element which its atomic number is:

   a- 2 b- 7 c-9 d- 19

10. The 3rd period starts with elements their oxides are as following:

    a- Acidic, amphotoric then basic b- Acidic, basic then amphotoric

    c- Basic, acidic then amphotoric d- Basic, amphotoric then acidic

11. Metal oxides are .... oxides.

    a- acidic b- basic c- amphotoric d- neutral

12 The elements of 1st group are known as:

a- Halogens b- Inert gas c- Alkalines d- alkaline earth

13 The hydrogen element belongs to:

a- Group 1A b- Group 2A c- Group 7A d- Group 6A

14 The strongest alkaline earth metal in reaction with water is

a- magnesium b- calcium c- barium d- sodium

15 The hottest atmospheric layer is:

a- troposphere b- stratosphere

c- mesosphere d- thermosphere

16 The coldest atmospheric layer is:

a- troposphere b- stratosphere

c- mesosphere d- thermosphere

17 The planes fly in the ……… layer.

a- troposphere b- stratosphere

c- mesosphere d- thermosphere

18 The device used in measuring the atmospheric pressure is:

a- Altimeter b- Aneroid c- Barometer d- a and b

19 …………… layer extends from the sea level to the tropopause.

a- Troposphere b- Stratosphere

c- Mesosphere d- Thermosphere

20 The device used in measuring the altitude from the earth surface is.......

a- the altimeter b- Aneroid c- Barometer d- a and b

21 The ………. layer extends from the tropopause to the stratosphere.

a- troposphere b- stratosphere

c- mesosphere d- thermosphere

22 The charged cosmic radiations are dispersed in the ………. layer.

a- troposphere b- stratosphere c- mesosphere d- ionosphere

23 The ………. layer extends from the stratopause to the mesopause.

a- troposphere b- stratosphere

c- mesosphere d- thermosphere

24 The…….. is much vacuumed layer.

a- troposphere b- stratosphere

c- mesosphere d- thermosphere

25 The temperature decreases by ………………. at 2 Km above earth surface.

a- 6.5°C b- 13°C c- 5.6°C d-9.75°C

26 The atmospheric pressure is the …………….. of an air column per a unit area.

a- mass b- volume c- weight d- density

27 Meteors are burnt in the layer ……………… .

a- troposphere b-stratosphere

c- mesosphere d- thermosphere

28 The ionosphere is located in the upper part of the ………….. layer.

a- troposphere b- stratosphere

c- mesosphere d- thermosphere

29 The air moves ………….. in the stratosphere layer.

a- horizontally b- vertically

c- vortical d- no correct answe

30 The ionosphere is surrounded by two………… belts.

a- magnetic b- electrical c- ionic d- thermal

31 The atmospheric pressure on the top of a mountain …………….the atmospheric pressure at the sea level.

a- is greater than b- is less than

c- equals d- equals half of

32 The standard atmospheric pressure at the sea level is ………. Millibar.

a- 76 b- 1000 c- 1013.25 d- 1300

33 The………….. is considered the 1st atmospheric layer of the atmospheric layers.

a- troposphere b- stratosphere

c- mesosphere d- thermosphere

34 The ……….. is considered the 2nd atmospheric layer of the atmospheric layers.

a- troposphere b- stratosphere

c- mesosphere d- thermosphere

35 The Ozone layer is in the…………….

a- troposphere b- stratosphere

c- mesosphere d- thermosphere

36 The ozone molecule consists of ……………. .

a- four oxygen atoms | b- two oxygen atoms
c- three oxygen atoms | d- one oxygen atom

37 The ozone layer absorbs ………………… .

a- Infrared rays b-ultraviolet rays c- X-rays d- light rays

38 The ozone hole appears over ……………. .

a- the North Pole b- the South Pole c- the Middle East d- the Equator

39 The ………….. is used in extinguish fires.

a- methyl bromide gas b- halons
c- nitrogen oxide d- ultraviolet rays

40 The CFCs compounds break down under the effect of ultraviolet rays to release ………….. atoms.

a- carbon b- chloride c- oxygen d- Freon

41 ……………… element is considered as the main compouent of ozone.

a- Nitrogen b- Oxygen O_2 c- Hydrogen d- All the previous

42 The ozone layer doesn't allow the passage of ………… ultraviolet rays.

a- far b- medium c- a&b together d- near

43 ……….. are considered to have a large thermal effect.

a- Infrared rays b- Ultraviolet rays
c- Visible rays d- All the above

44 The ozone hole increases in ………….. of each year.

a- October b- September c- December d- January

45 ……………. is used as a coolant in cooling devices.

a- Methyl bromide gas b- Halons
c-Nitrogen oxide d- Freon

46 ……… is used as an insecticide to preserve stored agricultural crops.

a- Methyl bromide gas b- Halons
c- Nitrogen oxide d- Freon

47 ……………… results from the burning fuel of ultrasound airplanes (Concord).

a- Methyl bromide gas b- Halons
c- Nitrogen oxide d- Freon

48 From the negative effects of global warming is.........

a- Melting of ice at the north and south pole.

b- Severe climatic changes.

c- The lack of ozone gas in the atmospheric envelope.

d- a&b together.

49 Global warming happens because of:

a- The lack of CO_2 in the atmospheric envelope.

b- The increase of the amount of CO_2 in the atmospheric envelope.

c- The lack of plants on earth.

d- b&c together.

50 The ozone is measured in a unit called ………….. .

a- millibar b- Km c- C^{O} d- dopson

51 The increase of CO_2 percentage is caused by …………….. .

a- cutting trees b- burning forests
c- burning fossil fuel d- all the above

52 Melting of ice in the north and south pole lead to the extinction of polar animals like……………………. .

a- crocodiles b- deers c- monkeys d- polar bears

53 Which of the following terms is more precise in describing the remains and traces of old living organisms preserved in sedimentary rocks?

a- Extinction b- The red list c- Fossils d- Solidification

54 To have a fossil of any organism, what do you expect to be available to it?

a-A hard skeleton. b- A medium to protect it from decomposition.
c- Fast burial after death. d- All the above.

55 On the solidification of the resinous matter secreted by pine trees in the old geological periods it forms ……………

a- fossil of a complete body b- amber fossil
c- trilobite fossil d- nummulites fossil

56 Is the cake considered as mold?

a- Yes, because it holds the same external details from the mold.

b- Yes, because it holds the same inner details from the mold.

c- No, because it holds the same inner and external details from the mold.

d- No, because it doesn't hold any details from the mold.

57 If you were a collector of snail and clam shells from the sea beach, which one would be suitable to make a cast fossil?

a- Only the ammonite shell.
b- Only the clam shell.
c- The shell of ammonite and clam.
d- None of them.

58 Worms' tunnels fossil is formed because of ……………. .

a- the presence of hard skeleton.

b- the activity of worms during its life.

c- the death of the worms and its fast burial in sedimentary rocks.

d- the death of the worms and its fast burial in snow layers.

59 What's the kind of fossil formed when a plant leaf falls on a sedimentary rock in the beginning of its formation then it solidifies?

a- Trace.
b- Cast.
c- Mold.
d- Petrified fossil.

60 Is the dinosaur's eggs an example for petrified fossils?

a- Yes, because minerals replaced its organic material part by part.

b- Yes, because it holds the inner details of the eggs.

c- No, because it is not considered as a fossil.

d- No, because it doesn't indicate the remains of dinosaur after its death.

61 What happened when silica replaced the wood of the trees' stems and trunks which are older than 35 million years?

a- A complete body fossil has been formed.

b- A petrified fossil has been formed.

c- A trilobite has been formed.

d- A dinosaur tooth fossil has been formed.

62 Not all the fossils are considered index fossils and that is because they are characterized by …………….. .

a- long range of time and limited geographical range

b- short range of time and wide geographical range

c- long range of time and wide geographical range

d- short range of time and limited geographical range

63 Which of the following fossils indicates that the environment they were formed in was a hot and rainy tropical environment?

a- Nummulites.
b- Ferns.
c- Coral.
d- Archaeopteryx.

64. The fossil record points to the life evolution in plants from simple to complicated higher forms, and the evidence for that is………….. .

a- angiosperms preceded gymnosperms

b- ferns preceded mosses

c- algae preceded mosses and ferns

d. mosses preceded ferns

65. Which of the following fossils play an important role in petroleum exploration?

a- Foraminfera and radiolaria.

b- Nummulites and ammonites.

c- Forminfera and trilobite.

d- Radiolaria and nummulites.

66. Which of the following statements is more precise in describing the concept of extinction?

a- The date of death of the last one of the same species.

b- The continuous decrease in the numbers of individuals of the same species without compensation.

c- Everything involves the living organisms and non-living organisms in some environment.

d- The path that energy takes when transported from a living organism to another living organism in the environmental system.

B) Complete the following sentences:

1. The two scientists …… and ……. made modifications on Mendeleev's table.
2. Moseley put …… and ………… series below the periodic table.
3. The d-block contains ……. elements.
4. The transitional elements starts from ……………. period in the modern periodic table.
5. The modern periodic table consists of ………. horizontal periods, ……………. vertical groups.
6. By increasing the atomic number, the value of mass numbers will…………..in the periods of the periodic table.
7. By increasing the atomic number, the value of electronegativity ………….. in the groups of the periodic table.
8. Each period in the modern periodic table starts with ………. elements and ends with ……….. elements.

9. The strongest non-metal elements are in the …………….. group.
10. The thickness of troposphere is about …………….. .
11. As we go up 1 km above the sea level the temperature …… with ……………. .
12. The atmospheric pressure at sea level equals …………. millibar.
13. The aneroid is used to …… .
14. The stratosphere extends with thickness equals ……….. Km.
15. On the formation of ozone layer the oxygen molecule absorbs ………… which breaks the bond between …………… to make each atom bonds with ………… forming the ozone molecule.
16. The ultraviolet rays are three kinds ……………., ………………… and……………. .
17. From the harmful effects of far and medium ultraviolet rays on human are ………………., …………….. and……………….. .
18. From the harmful effects of far and medium ultraviolet rays on amphibians are…………….. and……………….. .
19. From the harmful effects of far and medium ultraviolet rays on marine organisms are…………….. and……………….. .
20. From the harmful effects of far and medium ultraviolet rays on earth plants are ………………., …………….. and……………….. .
21. The ozone gas is formed in two steps:

    a) Breaking the bond of the …………molecule on absorbing ultraviolet rays converting in to two atoms of ……………… .

    b) The bonding of each free oxygen atom with ………….. forming ozone molecule.
22. ………….., ………… and……………. are considered from ozone layer pollutants.
23. ………….. is used as insecticide to preserve the agriculture storage.
24. When the density of green house gases increases in the earth's atmospheric envelope it allows the passage of ………….. and ……………….. .
25. …………. and………….. are from Montreal Protocol commandments.
26. The global warming phenomenon means ………………… .
27. The nanometer equals ………. meter.
28. The glass permits the passage of ………………. and …………… rays coming from the sun to be absorbed by earth in the green house.
29. The lights in Eiffel tower, light and sound project in Abu Simbel temple Aswan and other monuments are turned off in the ……….. day.

30 The fossil is the trace and remaining of living organisms ………… preserved in ……………

31 The fossils types differ according to their way of …………. .

32 The suitable medium to form a mammoth fossil is …………… .

33 To have a complete body fossil it must be buried ………. as soon as it is dead in a medium protects it from …………… .

34 The mammoth fossil was discovered in the beginning of the …………. century and it was still keeping its ………………… .

35 Resinous is secreted from …. which were common during some ………….. geological periods.

36 When the snail's shell decomposes it will leave ……………… which carries the internal details of the snail.

37 By studying the fossil record it shows that ……………. started first in ………….then established on ……………. .

38 The presence of fossils like radiolarian and foraminifera in the exploration wells' rocks indicates the ………….. of these rocks and the suitable conditions to form ………….. .

39 Extinction is the continuous decrease in …………… of ………… species of living organisms without ………… until all the individuals of the species……………… .

40 The fossils present in ……….. areas …………… and known as …………… indicate the extinction of species once was living organisms and most of them have …………. then ……………. before the creation of human.

41 Removing forests leads to ………….. and ……………. .

42 The demanding for many people on fur and skin of animals led to the …………… of hundreds of kinds of …………. and …………. .

43 Complete the following table:

Atmospheric layer	Its order	Its thickness	Its content
1- …………………..	3rd	………………..	………………..
2-The stratosphere	…………………	………………..	………………..
3-………………..	………………………	590km	…………………

C) Put (√) in front of the right statement and (X) in front of the wrong one with righting the wrong:

1 The chemical elements have been categorized in a table to ease its studying.

2. The elements with the same physical and chemical properties has been put in horizontal periods.
3. Mendeleev arranged the elements descendingly according to their mass.
4. Mendeleev put more than element in the same place like nickel and cobalt.
5. Rutherford discovered that the nucleus contains +ve charged protons.
6. The atomic number of every element increases by one over the element that precedes it in the same period.
7. Bohr had discovered the main energy levels.
8. The transitional elements groups are symbolized by (d).
9. The number of known elements till now is 92 element.
10. The atomic size decreases in periods as the atomic number increases.
11. In water molecule the oxygen element has more affinity to attract the bonding electrons than the hydrogen element.
12. The covalent bond becomes ionic when the difference in electro negativity between the bonded atoms = zero.
13. It is easy to identify the semi-metals from their electronic structure.
14. Each period starts with a weak metal.
15. The metallic property in group (1A) increase as we go from up to down in the group.
16. 50% of the mass of the atmospheric envelope is in some area in between the sea level and a 3 Km elevation.
17. The troposphere is the 1st layer in the atmospheric envelope.
18. All the atmospheric phenomena like rain, wind and clouds occur in the ionosphere.
19. The satellites revolve around the earth in a region called the exosphere.
20. The standard atmospheric pressure at sea level equals 76 millibar.
21. The temperature in the troposphere decrease at a rate of 6.5 degree each 1 Km up.
22. The ionosphere is surrounded by Van Ellen's belt which is responsible for scattering the harmful cosmic rays away from earth.
23. The stratosphere is the 3rd layer in the atmospheric envelope.
24. The air moves horizontally in the bottom part of the stratosphere.
25. The troposphere contains most of the atmospheric envelope.
26. The altimeter is used to determine the elevation of airplanes from the sea level.

27. The Aurora phenomenon appears as colored light curtains at the north and south poles.
28. The pilots prefer to fly their airplanes in the upper layer of the mesosphere.
29. The air moves vertically in the stratosphere.
30. The ozone layer is in the stratosphere.
31. The millibar is the unit of measuring the ozone degree.
32. The increase of carbon dioxide percentage in the atmospheric envelope leads to the increase in temperature.
33. Lacking of plants on earth leads to the increase in temperature.
34. The extinction of some polar animals is from the negative effects of global warming phenomenon.
35. The ozone layer allows the passage of all ultraviolet rays near and medium.
36. The ozone layer acts as a protective shield for the living organisms.
37. The halons are produced from the burning of supersonic airplanes fuel.
38. The world celebrates the ozone day in december of each year.
39. Methyl bromide is used in extinguishing fires.
40. Nitrogen oxides results from fuel burning.
41. The ozone layer erosion differs every year.
42. The methane gas and nitrous oxide are considered from the green house gases.
43. The ozone molecule is formed by bonding three free oxygen atoms together.
44. The ozone layer lies at altitude from 20-30 Km.
45. The far and medium ultraviolet rays cause skin cancer and cataract to humans.
46. The Freon is used as a coolant in cooling devices.
47. Methyl bromide is used as an insecticide.
48. The ultraviolet rays break chlorofluorocarbon compounds to release active chlorine atoms.
49. From the negative effects of climatic changes the happening of tropical hurricanes, destructive floods, drought waves and forests fires.

D) Correct the underlined word(s):

1. The elements in <u>Mendeleev's</u> table are arranged according to the increase of atomic number.
2. <u>Rutherford</u> discovered the main energy levels.

3. The elements were arranged in Moseley's table according to the way the energy sublevels were filled.
4. The electronegativity values increase in the groups as the atomic number increases.
5. Each period ends with a non-metal.
6. The strongest non-metal element occurs in the 1st group (1A).
7. Non-metal oxides are considered basic oxides.
8. The elements of the 1st group (1A) are known as basic earth metals.
9. The archaeopteryx fossil is a kind of extinct elephants.
10. The resinous matter protects the insects inside it from decomposing.
11. The mold is a copy of the outer shape of the shell.
12. The trace is what the living organism leave after its death in the sedimentary rocks.
13. The clam shell decomposes after the mineral sediments fill its bores laving a rock mold of the inner surface details.
14. Petrified wood is considered from rocks.
15. The nummulites fossil is used for indicating the age of sedimentary rock.
16. The ammonite fossil indicates that the environment it lived in was warm, clear and shallow seas.
17. The ferns indicate that the environment it lived in was a sea floor.
18. The desert environment contained almost third of the living organisms on land.
19. The Quagga is the most famous extinct kinds in the old times.
20. The dinosaurs are the most famous extinct kinds recently.
21. The passenger pigeon is from the birds that can't fly because of its small wings.
22. The red list contains about 5 thousands extinct kind in year 2008.
23. The environmental systems are safe places which are specified to protect the endangered species in their natural environments.

E- Write the scientific term indicated by the following statements:

1. The ascending order of the elements according to their atomic mass.
2. The ascending order of the elements according to their atomic number.
3. The horizontal rows in Mendeleev's table.
4. The vertical columns in Mendeleev's table.
5. Indicated by the letters K, L, M, N, O.

6. Indicated by the letters s, p, d, f.
7. A kind of elements symbolized by letter (B).
8. The block that contains the groups from 3A to 6A.
9. The block that contains the series of luthanides and actinides.
10. The ability of the atom in the covalent molecule to attract the chemical bond electron to it.
11. A kind of oxides reacts as basic oxides or acidic oxides according to the reaction condition.
12. A kind of elements in which their valency electrons contain less than 4 electrons.
13. A kind of elements in which their valency electrons contain more than 4 electrons.
14. A group contains the strongest non-metals.
15. The block that contains the groups from 3Ato 7A.
16. A region between mesosphere and thermosphere.
17. The 4^{th} layer of the atmospheric envelope.
18. A device used to measure the altitude from earth's surface.
19. A layer of the atmospheric envelope in which air moves vertically.
20. Two magnetic belts help in dispersing the harmful cosmic radiation away from the earth.
21. A phenomenon looks like a colorful light curtains seen in the two poles.
22. The atmospheric envelope layer that contains a certain amount of helium and hydrogen gases only.
23. The region where the atmospheric envelope merges with the outer space.
24. A phenomenon that increases the percentage of carbon dioxide and leads to an increase in temperature.
25. A kind of gases formed in the stratosphere.
26. The gas resulting from the reaction of a chlorine atom with ozone gas.
27. A kind of rays causes the rising of temperature in the stratosphere layer.
28. The traces and remains of the old living organisms which are preserved in the sedimentary rocks.
29. The traces that indicate the activity of the living organisms during their life.
30. The traces that indicate the remains of the old living organisms after their death.
31. The process of conversion of the parts of old living organisms in to solidified materials as a result of replacing the organic material of the organism with minerals.

32 Fossils of living organisms lived for a short period of time and in a wide geographical range.

33 The fossils present in the rocks of different regions and they indicate the evolution and extinction of living organisms.

34 The continuous decrease in numbers of individuals from the same species of living organisms without compensation with birthing.

35 Hunting wild animals with a random unorganized way which exposes it to extinction.

36 The path which the energy takes when transporting from a living organism to another one inside the environmental system.

37 The environmental system that is affected severely by the absence of one species of the living organisms that live in it.

38 The environmental system that is not affected severely by the absence of one species of the living organisms that live in it.

39 Safe places that are specified to protect the endangered species in their natural environment.

H) Coupling question:

Match to (A) what is suitable from (B).

1-

Column (A)	Column (B)
1- Altimeter	a- A device used to determine today's weather.
2- Aneroid	b- A suitable layer for airplanes flying.
3- Troposphere	c- A device used to measure the altitude of planes.
4- Stratosphere	d- The hottest layer in the atmospheric envelope.
5- Thermosphere	e- The layer that has all the weather phenomena.
6-Mesosphere	f- The coolest layer in the atmospheric envelope.

2-

Column (A)	Column (B)
1- A fossil that indicates the life details of an old plant is	a- Radiolaria.
2- A fossil that indicate the suitable conditions of formation of petroleum is	b- Archaepteryx.
3- A fossil that is considered the link between the reptiles and birds is	c- Amber.
4- An invertebrate fossil preceded the vertebrates in life is	d- Petrified wood.
	e- Dinosaur.

3-

Column (A)	Column (B)
1- The process of converting the part of living organism to petrified materials is	a- Fossil record.
2- The fossils which are in the rocks of different regions and indicate the extinction and evolution of living organisms are	b- Petrification.
3- One of the most important factors of extinction in the modern age is	c- Protectorates.
4- A list contains the endangered species and their categorization according to the danger degree is	d- Natural disasters.
	e- Red list.

Essay Questions:

A) Give reasons for:

1. Fluoride is considered from the strongest non-metallic elements.
2. Cesium is considered from the strongest metallic elements.
3. Sulphur dioxide is considered as acidic oxide.
4. Barium oxide is considered as basic oxide.
5. Aluminum oxide is considered an amphotoric oxide.
6. By increasing the atomic number of the elements their atomic weight decreases.
7. Starch (NH_3) is considered as ionic-covalent compound.
8. It is hard to identify the properties of metalloids from their electronic structure.
9. Rain, clouds and winds are in the troposphere.
10. The ionosphere is very important to radio stations.
11. The occurrence of the aurora phenomenon.
12. The upper part of the thermosphere is called ionosphere.
13. The temperature increase as we go higher in the stratosphere layer.
14. The continuity of ozone layer erosion.
15. The ozone layer acts as a protective shield for the living organisms.
16. The increase of the carbon dioxide percentage in the atmospheric envelope.
17. The trading or producing CFCs compounds is prohibited.
18. The petrified wood is considered from fossils in spite of their resemblance to rocks.
19. The amber is considered as suitable medium to form a complete body fossil.
20. The danger of removing the tropical forests on the life of living organisms.
21. The desert ecosystem is affected when one species is absent.
22. The danger of overhunting on wild animals.
23. The farmers hunt the Tasmanian cat.
24. The dodo bird is an easy target to hunt.
25. The rhinoceros is considered as endangered species.
26. Some nation governments are concerned by establishing natural protectorate areas.
27. The UNESCO choose Waadi Hetan region to be a world heritage region.

B) What happens in the following situation?

1. Put a magnesium strip inside a test tube contains oxygen.
2. Adding the purple sun flower solution to magnesium hydroxide.
3. Adding the purple sun flower solution to a jar has a piece of burning coal.
4. Dissolving magnesium hydroxide in water.
5. The absence of electro negativity difference between the hydrogen atom and oxygen atom in water molecule.
6. The drop of water temperature to 4 °C.
7. The decrease of the value of the water's latent heat.
8. The breaking of water in to its two elements by heating.
9. The passage of electric current through a Hoffman voltmeter containing acidic water.
10. Throwing synthetic cleaning substances in water.
11. To dipping of old insects in amber.
12. The solidification of the mineral sediments inside the ammonite then the decomposition of its shell.
13. Putting the clam's shell on the surface of a planned piece of clay then pressing it gently.
14. The continuous evolution in manufacturing hunting weapons.
15. Hunting the passenger pigeon in great numbers.
16. Extinction of a species from a balanced ecosystem.
17. The falling of acidic rain on the trees of forests.
18. The low rate of reproduction of the passenger pigeon.

C) Compare between the following:

1. Alkalies and earth alkalines.
2. The group and the period in the periodic table.
3. The property of atomic volume and the property of electro negativity in the periodic table (in view of definition).
4. Altimeter and aneroid (in the view of their usage).
5. The troposphere layer and ionosphere layer (in the view of pressure and temperature).
6. The mesosphere layer and the thermosphere layer (in the view of pressure and temperature).
7. The atmospheric pressure and atmospheric envelope (in the view of definition).

D) Mention one difference between the following:

1. The cast and trace.

2. The mammoth and amber fossils.
3. Ferns and coral fossils.
4. The nummulite and foraminifera fossils.
5. The simple ecosystem and the complicated ecosystem.
6. The benefits of Ras Mohamed protectorate and Waadi Hetan region.

E) What is meant by each of the following?

1- Montreal protocol. 2- CFCs compounds. 3- IPCC. 4- Global warming. 5- STP. 6-Ozone hole. 7- Dopson. 8- NON-CFC. 9- Green house gases. 10- Energy saving lamps. 11- Green house phenomenon. 12- Standard pressure and temperature.	13- The nanometer. 14- Fossil. 15- Index fossil. 16- Extinction. 17- Petrification. 18- Red list. 19- The trace. 20- The mold. 21- IUCN. 22- Fossil record. 23- Petrified fossil.

F) What is the importance of?

1- The two Van Allen's belts.
2- Ozone layer.
3- Altimeter.
4- Troposphere.
5- Ionosphere.
6- Exosphere region.
7- Satellites.
8- Aneroid.
9- Mesosphere.

G) Mention one example for:

1- The trace.
2- A solid mold.
3- The cast.
4- Fossil of complete body.
5- Petrified fossil.
6- Microscopic fossil.
7- Endangered bird.
8- Endangered plant.
9- Extinct bird.
10- Bird habitats in north America.
11- Animal habitats bamboo forests.

Exam (1)

1st question:

Complete the following sentences:

1. Mendeleev organized the elements according to the similarity in …………….. .
2. The ozone layer disperses the ……………. rays away from the earth's surface.
3. From the extincted animals in the old ages ………. and …………… .
4. Sodium is kept under the surface of …………. so as not to react with …………… .

2nd question:

Choose the right answer:

1. The transitional elements start to appear from the beginning of the……. period.

   a- second b- third c- fourth d- fifth
2. The extinction of Tasmanian cat is because of ………… .

   a- overhunting b- the destruction of original inhabitant

   c- environmental pollution d- climatic changes
3. The second layer of the atmospheric envelope is called ………….. .

   a- stratosphere b- thermosphere

   c- troposphere d-mesosphere
4. The snow crystal's shape is …………… .

   a- hexagon b-pentagon c-Octagonal d- quadrilateral
5. The fossils exist in the sedimentary rocks in the Mokattam Mountain are

   a- Ferns b-Coral c-Nummiulite d- all the previous
6. From the endangered species:

   a- The bold eagle. b- The passenger pigeon.

   c- Tasmanian. d- Dinosaur.

3rd question:

Give reasons for:

1. Liquefied nitrogen is used in preserving cornea.
2. The lower part of the stratosphere layer is suitable for airplanes flying.
3. Petrified wood is considered from fossils.

4th question:

Put (√) in front of the right statement and (X) in front of the wrong ones in the following:

1. The elements of block "P" are organized in 5 groups. ( )
2. The index fossil indicates the age of the sedimentary rock. ( )
3. The halons are produced from supersonic airplanes. ( )
4. The altimeter is a device used to measure the altitude of planes on the knowledge of atmospheric pressure. ( )
5. The elements of group (1A) and (2A) are good conductors for heat and electricity. ( )
6. The atmospheric pressure decrease by increasing the altitude from the sea level. ( )

Exam (2)

1st question:

A- Choose the right answer:

1. There are ……………. bonds between water molecules.
   a- metallic b- ionic c- hydrogen d- covalent
2. The air in the troposphere layer moves ………. .
   a- horizontally b- vertically c- inclined d- no right answer
3. The volume of hydrogen gas evolving from water electrolysis equals………. the oxygen volume.
   a- that of b- double c- half d- four times
4. The second layer of the atmospheric envelope is called ………….. .
   a- thermosphere b- stratosphere c-troposphere d- mesosphere

B- The element ($_{17}Y$) from the elements of the periodic table; find:

1- Electronic distribution. 2- The group number.

3- The periodic number.

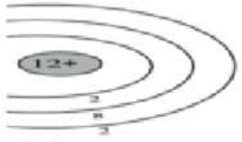
2nd question:

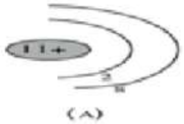
A- Put (√) in front of the right statement and (X) in front of the wrong ones:

1. The earth alkalines are good heat conductors.
2. The atmospheric pressure decreases as the altitude from sea level increases.
3. As the atomic number increases the metallic property increases.
4. The index fossil indicates the age of sedimentary rocks.
5. The ionosphere is surrounded by two magnetic belts known as Van Ilene's belt.

B- See the figure then answer:

1. Which one of the two graphs represents a +ve ion?
2. Which one of the two graphs represents a neutral ion?
3. Indicate the position of the atom in the periodic table (period-group)





3rd question:

Write the scientific term for each of the following:

1. The continuous decrease in the number of individuals of the same species of living organisms without compensation until all individuals die.
2. A bird with small wings and short legs extincted from the Indian islands.
3. The ability of the atom in covalent molecule to attract the chemical; bond electrons to it.
4. Elements in block "S" and they are divalent and lie in the second group of the periodic table.
5. Safe places are specialized for protecting endangered species in their original inhabitant.

4th question:

Complete the following statements:

1. The electronegativity in the modern periodic table increases from …………. to …………… inside the same group.
2. The last level of metallic elements contain ……………. than four electrons when the non-metallic elements contain …………….. than four electron in their last level.
3. The ozone layer is in the …… layer.
4. Fossils always exist in the ……. rocks.
5. The elements of group 7A are called …………… .
6. …………. is considered from the safe places that has endangered species.
7. The bond between water molecules is called ………….. bond.
8. What is left by the living organism's body after its death in the sedimentary rocks is known as ………………. .

قائمة المراجع المستخدمة فى تأليف الكتاب

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تم الطبع بالشروق الحديثة ـ القاهرة
بالمواصفات الفنية الآتية

عدد الصفحـات : ١٤٠ صفحة

المقـــــاس : ٥٧ × ٨٢ سم

نـــوع الـــورق : لا يقل الداخلى عن ٨٠ جرام والغلاف ٢٠٠ جرام

ألـــوان الطبـــع : ٤ لون للداخلى والغلاف

جميع حقوق الطبع محفوظة لوزارة التربية والتعليم
داخل جمهورية مصر العربية

الشروق
الحديثة للطباعة والتغليف
القاهرة : ٨ شارع سيبويه المصرى ـ ت : ٢٤٠٢٣٣٩٩ ـ فاكس : ٢٤٠٣٧٥٦٧ (٠٢)
مدينة العبور ـ المنطقة الصناعية